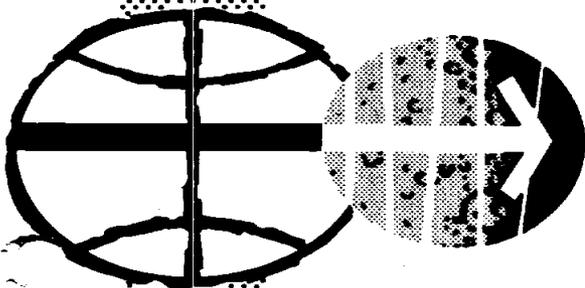




NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Apollo 16 Spacecraft Commentary

April 16 – April 27, 1972



**MANNED SPACECRAFT CENTER
HOUSTON, TEXAS**

TABLE 3-I.- SEQUENCE OF EVENTS

<u>Events</u> ^a	<u>Elapsed time</u> <u>Hr:min:sec</u>
Lift-off (Range zero = 17:54:00 G.m.t., April 16, 1972)	00:00:00.6
Earth orbit insertion	00:11:56
Translunar injection maneuver	02:33:37
S-IVB/command and service module separation	03:04:59
Translunar docking	03:21:53
Spacecraft ejection	03:59:15
First midcourse correction	30:39:01
Scientific instrument module door jettison	69:59:01
Lunar orbit insertion	74:28:28
S-IVB lunar impact	75:08:04
Descent orbit insertion	78:33:45
Lunar module undocking and separation	96:14:00
Circularization maneuver	103:21:43
Powered descent initiation	104:17:25
Lunar landing	104:29:35
Mission Control Center time update (+00:11:48)	118:06:31
Start first extravehicular activity	118:53:38
Apollo lunar surface experiment package first data	121:44:00
End first extravehicular activity	126:04:40
Start second extravehicular activity	142:39:35
End second extravehicular activity	150:02:44
Start third extravehicular activity	165:31:28
Plane change	169:05:52
End third extravehicular activity	171:11:31
Lunar ascent	175:31:48
Vernier adjustment maneuver	175:42:18
Terminal phase initiation	176:26:05
Terminal phase finalization	177:08:42
Docking	177:41:18
Lunar module jettison	195:00:12
Separation maneuver	195:03:13
Mass spectrometer experiment and boom jettison	195:23:12
Subsatellite launch	196:02:09
Transearth injection	200:21:33
Mission Control Center time update (+24:46:00)	202:18:12
Second midcourse correction	214:35:03
Start transearth extravehicular activity	218:39:46
End transearth extravehicular activity	220:03:28
Third midcourse correction	262:37:21
Command module/service module separation	265:22:33
Entry interface (400 000 feet)	265:37:31
Begin blackout	265:37:47
End blackout	265:41:01
Forward heat shield jettison	265:45:25
Drogue deployment	265:45:26
Main parachute deployment	265:46:16
Landing	265:51:05

^aSee Table 3-II for identification of events shown in this table.

PAO This is Apollo Saturn Launch Control. We're at T-minus 1 hour 30 minutes 58 seconds and counting. Just seconds from now a final gem's speres release will be made. A gemshere is a weather balloon which measures the winds aloft. However, we don't anticipate any problems with any type of weather this morning. The spacecraft checkout is continuing ahead of schedule according to the test conductor Skip Children. The cabin purge has been completed and the spacecraft pressurized with a 60-40 mixture of oxygen and nitrogen. This mixture is similar to air, is pressurized slightly above the ambient pressure and then the crew checks for any possible decay in that pressure. This insures that we've had a proper seal with the hatch, which came closed earlier and that we have no spacecraft leaks. These activities continuing at this time. T-minus 1 hour 30 minutes 9 seconds and counting. This is Kennedy Launch Control.

END OF TAPE

PAO This is Apollo Saturn Center Launch Control we're at T minus 1 hour 20 minutes 57 seconds and counting. Just a short time ago, a first motion signal was sent to the vehicle. This signal is send down and checked in Houston and by the Range to ensure that they in turn are receiving it and will receive it at lift-off. Pressure check have been completed inside the spacecraft and the booster protective cover is now being placed over the hatch. The white-groomed crew is completing storage and taking down the environmental protection plates around the spacecraft. They'll be leaving the spacecraft shortly and at about T-minus 43 minutes in the countdown. The white room will be retracked to the 12 degree mark. This is after the crew has completely cleared the -- the close out crew has completely the cleared the area. They are expected to be clear of the area by the T-minus 55 minute mark. Our countdown is continuing smoothly at this time. T minus 1 hour 20 minutes, 1 second and counting. This is Kennedy Launch Control.

END OF TAPE

PAO This is Apollo Saturn Launch Control T minus 1 hour 10 minutes 58 seconds and counting. At the 1 hour and 13 minute mark, scheduled with a cue-ball simulated command, this command goes to the cue-ball and is read out in the spacecraft by the spacecraft commander. The cue-ball is an angle of attack here pitched above the launch escape system, and it's used to give the spacecraft commander and the crew any signals which would indicate an out of tolerance condition during the early stages of flight. The count down moving along well at this time. T minus 1 hour 10 minutes 25 seconds and counting. This is Kennedy Launch Control.

END OF TAPE

PAO This is Apollo Saturn Launch Control. We're at T minus 1 hour 59 seconds and counting, going into the final hour of the countdown. The spacecraft stabilization and control system has been powered up checks have been run on that by the spacecraft Commander John Young and the Command Module Pilot John Mattingly. We've also just received word that King Hussein has landed on the airstrip at Cape Kennedy and will be over to the Kennedy Space Center shortly to view the launch. Our countdown is continuing here at Kennedy Space Center. We'll switch now to the Mission Control Center in Houston for a status there.

PAO This is Apollo Control Houston at minus 1 hour and counting. The worldwide manned spaceflight network is prepared for launch at this time. The network is clean without discrepancy. The calm but intent atmosphere best describes the mood of the Mission Control Center at this time. Our cast of characters today - Flight Director Gene Kranz, the most veteran of the active flight directors wearing his traditional white vest. This is his team - the white team of flight controllers. Our Cap Comm Gordon Fullerton served in the same capacity in Apollo 14 when the Alan Shepard crew was also launched on a Sunday. At all of the consoles here in Mission Control Houston an experienced team of flight controllers ready to swing in action in less than an hour. This is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Saturn Launch Control at T-minus 54 minutes and counting, T-minus 54 minutes and counting. Earlier this morning the cryogenics were loaded aboard the Saturn 5 space vehicle. The flight crew then came aboard and is now onboard completing a series of communications checks. The weather continues to be clear as it's supposed to be for our launch time, and we continue to aim for a launch at 12:54 PM Eastern Standard Time. The Command Communications System which carries the launch vehicle Commands on S-band frequency has now been turned on for launch. The liquid hydrogen-liquid oxygen, the cryogenic fuels, loaded earlier, are continuing to be topped off. Countdown continuing at this time. We've just received word that the Vice President of the United States, Spiro Agnew, has arrived at Cape Kennedy and is coming across the Kennedy Space Center to view the launch. Now at T-minus 53 minutes and counting, this is Kennedy Launch Control.

END OF TAPE

PAO This Apollo Center Launch Control passing the 51 minute mark, T- minus 50 minutes, 57 seconds and counting. And just received report that the launch site recovery forces and the helicopters are on station and ready to support the launch of Apollo 16. D van becon checks are under way at this time. The -- our becons aboard the instrument unit of the space vehicle and use for tracking by the eastern test range during powered phase of flight. Both of the high speed elevators that launch complex 39A, these are high speed elevators and the mobile launcher are parked now -- the 320 foot level as the crew disclose after has moved clear of the area. The swing arm, swing arm 9 has just moved back to the retrack position. This is a 12 degree standby position. From this position, it can be quickly returned to the spacecraft, if needed, and will remain at this parked position until the final moment of launch at T-minus 5 minutes approximately, it will swing back to the full retrack position. The countdown is continuing at this time, T- minus 49 minutes, 55 seconds in counting, this is Kennedy Launch Control.

END OF TAPE

PAO This is Apollo Saturn Launch Control. We're at T-minus 34 minutes 56 seconds and counting. At this time the Support Controller, Joe Barfus, has indicated that the industrial water system is ready to support the launch. At the T-minus 1 minute mark, the flame deflector underneath the 5 Saturn 5 first stage engine will start being covered with water coming out at 13 000 gallons per minute. At the T-0 mark the swingarms will be quenched with water 7500 gallons per minute. As the vehicle lifts off at the plus 2 second mark, 50 000 gallons per minute of water will flush the mobile launcher decks and another 30 000 gallons will be plunging the flame deflectors. In the spacecraft, the astronaut team is making a series of switch checks, spacecraft commander has made checks following the retraction of swingarm 12 to arm the various pyrotechnics, this includes the launch escape system aboard the vehicle. Range safety command checks have now been completed. T-minus 33 minutes 54 seconds and counting, this is Kennedy Launch Control.

END OF TAPE

PAO This is Apollo Saturn Launch Control. T-minus 43 minutes and counting. A critical power transfer test was just conducted. During this test the flight vehicle batteries take on the work load having been shared up to that point by an external source. We've gone back to that external source again and we'll stay on that saving the flight batteries until the final minute, approximately 50 seconds in the count down. Superintendent of range operations just reported that the Kennedy Space Center is clear for launch. Now T-minus 42 minutes 30 seconds and counting, this is Kennedy Launch Control.

END OF TAPE

PAO This is Apollo Saturn Launch Control, we're at T-minus 27 minutes, 58 second and counting. Just a few moments ago, various elements of the launch team began reporting into the test supervisor, Gordon Turner, reporting that we were go for continuing the countdown. At this time, we're continuing to look at the problem with a backup yaw gyro. This is still being evaluated but we expect a resolution on that momentarily. Various other elements of the countdown all continuing well at this time, T-minus 27 minutes, 30 seconds and counting. This is Kennedy Launch Control.

END OF TAPE

PAO This is Apollo Saturn Saunch Control. We're at T minus 24 minutes 58 seconds and counting. The problem which we spoke of earlier, the problem with a backup YAW-GYRO has been resolved and we have been given a go for launch. All possible modes of failure were evaluated should this be a problem with flight hardware and it was determined after evaluating each of these that they would have no impact on the mission. Liquid oxygen, liquid oxygen, liquid hydrogen continue to be top off in the space vehicle and our weather continues to be good, predicted to be good for launch time. Aiming for a 12:54 pm Eastern Standard Time launch. Now at T minus 24 minutes 15 seconds and counting, this Kennedy Launch Control.

END OF TAPE

PAO This is Apollo Saturn Launch Control T minus 39 minutes 58 seconds and counting. Underway at this time are some checks of the Range Safety Command System. During these checks the signal is sent to receivers aboard the 3 stages of the Saturn V launch vehicle. This receiver is connected to distrust packages aboard the vehicle. If the vehicle should stray off path due to a malfunction, the Range Safety Officer could elect to send signals by way of these receivers to the distrust package. This would be done only after the Astronaut crew, of course, had executed their abort and were well away from the vehicle. During these tests the signals are sent with the distrust packages in an unarmed condition.. It's a check to insure that the signals are reaching the distrust packages or at least for the test reaching the receiver. The swing arm is now in the 12 degree position or parked position. The astronaut crew aboard the spacecraft now in an emergency situation could use their launch escape tower to clear themselves well away from the spacecraft in an emergency from the space vehicle in an emergency. In such an emergency they would be carried to a proper altitude at which the regular spacecraft parachutes would deploy and the crew then would make a normal recovery. They also have the option where the swing arm, at the 12 degree position to call it back where they could quickly then go across the swing arm, again having an option of either taking an elevator to safe carry at the bottom of the pad or a slide wire which has a cab attached to it which would carry them to the pad parameter. These would be decisions depending on the type of emergency. In the Launch Control Center the Vice President of the United States, Spiro Agnew, just walked into the viewing room and he will make plans to view the launch from here. Now at T minus 38 minutes 10 seconds and counting this is Kennedy Launch Control.

END OF TAPE

PAO This is Apollo Saturn Launch Control, T-minus 19 minutes and counting. T minus 19 minutes and counting, we just received word from recovery forces that all recovery forces are on station and ready to support the launch of the Apollo 16. Also, the Manned Spaceflight Network has indicated they are ready to support. An earlier problem with a power dropout in the switching station in Monrovia, West Virginia, has been taken care of by going to a backup station. T-minus 18 minutes, 34 seconds and counting, this is Kennedy Launch Control.

END OF TAPE

PAO This is Apollo Saturn Launch Control. We are at T minus 14 minutes, 59 seconds and counting. Scheduled at this time are some Mission Control Center updates to the computer clock aboard the command module. This is actually synchronizing the spacecraft timing system with that in the mission control center. Also the Command Module Pilot Ken Mattingly has been giving readouts on the service module quadrant. These are giving temperatures, pressures, and fuel quantities. A short time ago the S-II start tank chill down began. This is chilling that system to prepare it to accept the extremely cold liquid hydrogen. Computer checks are underway also at this time. A check going on is being checked with the vehicle digital computer to be sure that it is in the prepare to launch mode. Several of these computer checks are run during the count to insure proper communication between the computers in the launch control center and the mobile launcher and also to insure they are in the correct mode. Countdown continuing now. Passing the T minus 14 minute mark. This is Kennedy Launch Control.

END OF TAPE

PAO This is Apollo Saturn Launch Control, T minus 10 minutes and counting. We just heard from the spacecraft commander John Young that Casper and Orion are go for launch. The spacecraft is now on full internal power. Up to this point it's been sharing its power load with the ground supply. Short time ago, the astrocomm circuit was checked out. This is the circuit that the astronauts will be on during the launch phase. They'll be on this with Stony, the astronaut communicator here in the Launch Control Center, the launch operation's manager Paul Donnelly and the spacecraft test supervisor, Skip Chauvin. The crew, actually, goes on in the astrocomm circuit at the T minus 4 minutes mark in the countdown. Our weather continues to look good for a launch as we aim for a 12:54 PM eastern standard time liftoff. Now at T minus 9 minutes, 11 seconds and counting, this is Kennedy Launch Control.

END OF TAPE

PAO This is Apollo Saturn Launch Control, we're now passing the 6 minute mark in the countdown. Emergency detection system has now been placed in the launch mode. Houston flight has also indicated that they are GO for the automatic sequencer. At the T-3 minutes 7 second mark the launch will go on the automatic sequencer and from that point on the launch will be automatically handled by the sequencer. Coming up on the T-5 minute and 30 second mark at that time we'll be standing by for a go to launch from Mission Director, Chet Lee. Mission Director verifies GO for launch. Mission Director Chet Lee from Houston verifies GO for launch. All elements now reporting into the test supervisor Gordon Turner that they are go for launch. Now at T-5 minutes 13 seconds and counting this is Kennedy Launch Control.

END OF TAPE

PAO T minus 4 minutes, 32 seconds and counting and swing arm number 9 is now swinging back to the full retrack position. The astronaut crew aboard are making their final switch check reading off these final positions separation for launch and as we approach the final minutes here, we'll go into a relatively silent period as far as reporting goes, the launch team indicate that they will have only negative reporting. If there's problem, only, will they come up on the air at this time. Now at T minus 4 minutes, 3 seconds, and counting, this is Kennedy Launch Control.

PAO This is Kennedy Launch Control, Launch Operation's Manager Paul Donnelly just called the three astronauts and says that the Apollo 16 Launch Team wishes them good luck and God speed. They all replied "Thank you" and we now have a quiet circuit as they switch over to the astrocomm circuit. We're now at T minus 3 minutes 24 seconds and counting. We're approaching the time when the countdown goes on the terminal sequencer. The sequencer commands a variety of functions all which must occur in the proper sequence for the count to continue. Also, here in the Control Center, the people will continue to monitor what are called the red line values to ensure that everything is go for launch. The instrument unit flight, panel light now, on the status board indicate instrument unit ready, spacecraft ready, emergency detection system ready. We've passed the 2 minute, 50 second mark and we're now on the terminal sequencer. The terminal sequencer has started. The terminal sequencer will pressurize the fuel tank. These fuel tanks are pressurized to ensure that as the fuels deplete they are forced down to assure an even flow into the engine. The fuel tanks are now being pressurized. The S-IVB or third stage sequent oxygen tank has just been pressurized and the second stage, liquid oxygen tank has been pressurized. As we move down through the count at the T minus 17 second mark, we'll get a release of the guidance system in the instrument unit. Also, handled by the automatic sequencer will be the release of swing arms number 1 and number 2. The ignition of the Saturn V, five engines first stage five engines will take place at 8.9 seconds in the countdown, 8.9 seconds. That'll be the engines or the vehicle will then be held down until we build up 7.7 million pounds of thrust. At the T minus 3 minute mark, tape recorders onboard the spacecraft were turned on. These recorders record both voice and data. The spacecraft now to full internal cooling. The cooling load has been shared with the ground cooling. T minus 90 seconds and counting. T- minus 90 seconds and counting. At T minus 1 minute, 15 seconds, the spacecraft batteries will be turned on for launch. These batteries will

PAO give an additional power source to the spacecraft as well as acting as a backup for the fuel cells. The third stage liquid hydrogen tank now pressurized, all third stage tanks pressurized. Second stage tanks also pressurized. T minus 1 minute. T minus 1 minute and counting. Now --

END OF TAPE

PAO T minus 1 minute, T minus 1 minute and counting. Now moving into a final minute of the count. We'll be standing by to - for the switchover to internal power. Switchover taking place at this time going on internal power. T minus 45 seconds and counting Guidance aline just announced by John Young. That will be the last action taken by the crew aboard the spacecraft. T minus 35 and counting. Countdown continuing to go well, T minus 30, T minus 25, 24, 23, 22, 21, 20, 19, 18, 17, guidance release 15, 14, 13, 12, 11, 10, 9, we have ignition sequence start. The engine is now building up to 7.7 million pounds of thrust. We have a launch commit and we have a liftoff. The swing arm is moving back. Saturn V lifting off the pad, building up thrust. Refer the tower.

PAO Houston is now controlling.

CC Now we have good thrust in all 5.

SC Roger.

PAO Pitch and roll program started.

SC Roger.

PAO 16 now maneuvering to its proper flight path attitude. Mark 27 seconds - 36 seconds roll program completed, pitch profile still in progress - 40 seconds. Mark 50 seconds - cabin pressure relieving. Adjusting now from sea level to a space environment, 2 nautical miles in altitude.

CAPCOM Stand by for code 1 BRAVO.

SC Roger.

CAPCOM Mark, 1 BRAVO.

CAPCOM You are sea wet, 16.

SC Roger.

PAO That callout from CapCom Gordon Fullerton says Apollo 16 now capable of water landing. Mark 1 minute 12 seconds coming up on period of maximum aerodynamic pressure on the vehicle. 1 minute 22 seconds 6 nautical miles in altitude looking good. Mark 1 minute 30 seconds - 8 nautical miles in altitude. Mark 1 minute 41 seconds to pass through max Q, still looking good.

CAPCOM Through Max-Q and everything looks good.

PAO 16 now 12.5 nautical miles in altitude. Young, Duke, Mattingly moving out to the outer traces of the earths atmosphere.

CAPCOM Standby for mode 1 CHARLIE.

SC Roger, we're at 5 point CHARLIE.

PAO Mark 2 minutes 3 seconds. The status check in Mission Control by Flight Director Gene Krantz. The GO/NO-GO for staging. Coming up on center engine shutdown.

SC Shutdown.

CAPCOM Look at your N-board. You're go for staging.

PAO Center engine shutdown on time. 2 minutes 28 seconds, 26 nautical miles in altitude, 32 nautical miles down range. 2 minutes 35 seconds - 2 minutes 40 seconds coming up on staging.

SC Staging after ignition on the S2.

CAPCOM Roger.

PAO 2 minutes 53 seconds, a normal staging. Ycung, Duke, Mattingly now riding on 5 good second stage engine.

CAPCOM Go on all 5 on the S2.

PAO 3 minutes 2 seconds, the giant first stage falling away now, it's days work completed. Apollo 16 now 46 nautical miles in altitude, 80 nautical miles down-range. Coming up on skirt sep and tower jettison.

SC On time.

CAPCOM Roger.

SC Tower jettisoned.

CAPCOM Roger and we confirm your skirt sep, you're in mode 2 now.

SC Roger, mode 2.

PAO 3 minutes 28 seconds, the launch escape tower is ejected on time. Its surveillance role no longer required.

CAPCOM Steering has converged, CMC is GO.

SC Roger.

PAO Mark 3 minutes 45 seconds. Apollo 16 now 62 nautical miles in altitude, 135 nautical miles down-range. Apollo 16 now 33 feet shorter and 9000 pounds lighter. Unincumbered now for its mission in space.

CAPCOM 16, Houston. 1 minute and everything looks great down here.

SC Roger. It looks good up here too.

SC Hey Gordie, you ought to see that horizon, just gorgeous.

PAO Mark 4 minutes 10 seconds, 70 nautical miles in altitude, 170 nautical miles down range. Velocity now reading 10 600 feet per second. Mark 4 minutes 30 seconds in Mission Control Trajectory Data driving right down the middle of our plot boards as expected. Right now the flight path data is GO. Mark 4 minutes 45 seconds, 76 nautical miles in altitude, 220 nautical miles down range. Mark 5 minutes 10 seconds, still good performance on all 5 of the second stage engines. Second stage shutdown predicted at 9 minutes 19 seconds.

CAPCOM 16, Houston. Times are nominal. Level

CAPCOM sense of the A plus 37 and cutoff at
9 plus 19.

SC Roger.

PAO Mark 5 minutes 40 seconds, another
status check in Mission Control by Flight Director Gene
Kranz. His console is coming up all green, looking good
at this time.

CAPCOM By for S4B to COI capability. Mark,
you have it now.

SC Roger.

PAO Coming up on 6 minutes. CapCom Gordon
Fullerton reporting that 16 capable of reaching a minimum
orbit with a good third stage and service module engine.
We're at 6 minutes 8 seconds. Apollo 16 88 nautical miles
in altitude, 380 nautical miles downrange. Mark 6 minutes
30 seconds, velocity now reading 14 880 feet per second,
altitude 90 nautical miles for Apollo 16. Downrange dis-
tance of 440 nautical miles.

CAPCOM Stand by for S4B to orbit. Mark. You
have it now.

SC Roger.

PAO 6 minutes 50 seconds.

SC Delta, Gordie.

CAPCOM Roger, CHARLIE.

PAO Young, Duke, Mattingly now told that
they can reach orbit if given a good third stage. Mark 7
minutes, 91 nautical miles in altitude, 496 nautical miles
downrange. Mark 7 minutes 15 seconds. 16 flying almost
parallel over the ocean now with the young crew in a pitched
down position. Really moving out now for downrange distance.
We show Apollo 16 551 nautical miles downrange. Velocity
now reading 17 527 feet per second. Coming up on center
engine shutdown.

CAPCOM Roger. Inboard.

PAO Center engine shutdown on time. 7 min-
utes 50 seconds. 92 nautical miles in altitude. 620 nautical
miles downrange. Still showing stable thrust on the other
4 engines. They've got about a minute to go in burn time
remaining.

CAPCOM 16, at 8 minutes, looking good here.

SC PU shift.

PAO Mark 8 minutes 25 seconds.

CAPCOM 16, Houston. We saw the PU shift
looks good and your GO for staging.

SC Roger.

PAO 8 minutes 35 seconds. Apollo 16 now
93 nautical miles in altitude, 756 nautical miles downrange.

CAPCOM Post on time now.
SC Roger.
PAO That terse response from Apollo 16
Commander John Young. We're at 8 minutes 52 seconds. Apollo
16 now 807 nautical miles downrange. 92 nautical miles in
altitude. Velocity now reading 21 642 feet per second.
CAPCOM Stand by for Mode 4 capability. Mark.
You have Mode 4 now.
SC Okay, there was S2 shutdown.
CAPCOM Roger.
SC And we have S4B ignition.
PAO Mark 10 minutes 30 seconds -
CAPCOM Good on the S4B.
SC Roger.
PAO The Young crew has used up 2/3 of their
Saturn stages on the way to orbit. We see good performance
on the third stage, the S4B. That mode 4 report says Apollo 16
can achieve orbit on spacecraft power only. 9 minutes 50
seconds. Apollo 16 93 nautical miles in altitude 1011 nauti-
cal miles downrange. Velocity now reading 23 654 feet per
second. Mark 10 minutes 18 seconds of status check in Mis-
sion Control for orbit.
CAPCOM Apollo 16, Houston. You're GO for
orbit. Predicted cutoff 11 plus 49.
SC Roger. 1 - 49.
PAO Mark. 10 minutes 40 seconds. The pre-
dicted time of shutdown, 11 minutes 49 seconds. Apollo 16
now 93 nautical miles in altitude, 11 092 nautical miles
downrange. Mark. 11 minutes. Showing a buildup in velocity
now reading 24 621 feet per seconds and accelerating. Mark,
11 minutes 10 seconds. Velocity now reading 24 887 feet per
second, 98 per cent of the desired speed for insertion in
orbit. Less than 20 seconds now from time of shutdown.
Mark, 11 minutes 40 seconds. Apollo 16 now 14 000 nautical
miles downrange.
CAPCOM SECO
SC Roger. OFF.
PAO That was shutdown, right on the money.
SC Ditch 1 is coming off. >
CAPCOM Roger.
PAO Mark, 12 minutes 25 seconds -
CAPCOM 16, Houston. The range safety system
is safe. The orbit is GO.
SC Roger. Boy, it's just beautiful up here,
looking out the window. It's just really fantastic. And >
the thing worked like a gem.
CAPCOM Sure did.

APOLLO 16 MISSION COMMENTARY 4/16/72 CST 11:53 17/5

CAPCOM We copy. Now 62, and your orbit by
radar is 95 by 90.

PAO Mark, 12 minutes 54 seconds. That
enthusiastic report from orbit was from spacecraft Commander
John Young. Apollo 16 in what appears to be a safe orbit.
Preliminary maneuvers show 95 nautical miles by 90 nautical
miles. The Saturn 5 once again the apparent victor in its
tug-a-war struggle with the earths forces of gravity. We're
at 13 minutes 20 seconds ground elapsed time and Apollo 16
is in orbit.

END OF TAPE

CAPCOM 16, Houston. The booster looks good. It's reconfigured for (garbled)

CAPCOM 16, Houston. The Z-torquing angle will be plus .06. Over.

SC Plus, Roger, plus .06.

CAPCOM That's correct.

SC Okay, Gordie, we're on page 211 down through, we're getting to installing the COAS. That MA was the transducer. ECS.

CAPCOM Roger, Charlie.

CAPCOM Apollo 16, Houston.

CAPCOM Apollo 16 through Canarys. How do you read?

SC Okay, you sound good, Gordie.

CAPCOM Okay, we're noticing a possible blockage in the primary coolant lube. Would you have John check the glycol reservoir by-pass valve to be sure it's open.

SC Roger. Over.

SC Hay Gordie. Do you want us to go ahead and put the radiators on?

CAPCOM Stand by. Charlie, this is Houston. What ever you just did up there got the coolant lube flow back, we'd like to watch it for a minute before preceeding, over.

SC Okay, we're step 12 page 213 configuration with radiators by-pass we've got the original by-pass open and will not use them, and they are closed. I can't understand what it was though, Gordon. If the (garble) was accidently open, probably at some other time, the by-pass was closed and the inlet was open. (Garbled)

CAPCOM Roger, understand.

SC The clouds over (garbled) really is a spectular view.

CAPCOM Roger. I wish I was there with you.

SC I guess we're just over Canary looking down towards the other islands, and that sure is something.

PAO Apollo Control Houston. 20 minutes ground elaps time. That again that was John Young commander of Apollo 16 appraising the view over this Canary Island pass. We're at 21 minutes ground -

CAPCOM 16, Houston. You can preceed with the rest of the normal ETS configuration.

SC Roger. That's in work.

CAPCOM 16, Houston. We're having a kind of intermittent data down here due to a problem with Canaries antenna.

SC Okay, we're back up to glycol, two of the radiators now.

CAPCOM Roger.

PAO This is Apollo Control Houston. 22 minutes ground elaps time. We show a present orbit of 96 nautical miles by 91 nautical miles. About a minute to go until loss of signal with Canary. A quick status check being taken at Mission Control Center by flight director Gene Kranz with his flight control team to try and pass up a final few words with the 16 crew before we have loss of signal. We're at 23 minutes ground elapsed time, this is Apollo Control Houston.

CAPCOM 16, Houston. Data is back now good and every-thing looks fine as we come up 20 seconds to LOS. We'll see you at Carnarvon at 52:39.

SC Roger, 52:39 Gordon.

CAPCOM Enjoy the view there.

SC Well, we're just starting to come into darkness now, the sun set is just as beautiful as always in the space business.

CAPCOM Roger.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/16/72 CST: 12:17 19/1

PAO This Apollo Control, Houston, at 24 minutes ground elapsed time. We've had loss of signal over Canary with the Apollo 16 spacecraft. They will be reacquired at 52 minutes 39 seconds ground elapsed time. We'll pass along at this time peak heart rates during the launch phase of flight. Peak heart rate for Command Module Pilot, Ken Mattingly, during the powered flight phase of flight read 115, for spacecraft commander John Young, 108, and for Lunar Module Pilot, Charles Duke, 130. At 24 minutes ground elapse time, this is Apollo Control, Houston.

END OF TAPE

PAO This is Apollo Saturn Launch Control in the Launch Control Center at Kennedy Space Center. The successful launch of Apollo 16 took place at 12:54.00569 seconds, that is, 569 milliseconds past 12:54. Following the successful launch the Vice President of the United States came into the firing room and had the following to say to the launch team.

DR FLETCHER It is the best liftoff we've ever had and I think before I say anymore I'd like to introduce the Vice President Spiro Agnew.

AGNEW Thank you, Dr. Fletcher. Ladies and Gentlemen you make the superb common place. This is my seventh occasion to visit the Cape at the time of an Apollo launch and this was one of the finest because as Dr. Fletcher said, he thought it was so good. I have noticed one change since I've been here and that is that there is so much coolness in the room. I think you are getting a little bit bored with this thing, aren't you? I know you're not, and I assure that the people of this country aren't bored and if you went out in the vicinity of the Cape and looked around today you'd probably find the biggest crowd with more people enthusiastic about the space program than we've ever seen before. And, I want you to know that the administration's interest has not diminished and as Chairman of the Space Council mine continues to accelerate as I look forward to 17 and through the Skylab launchings to follow. What's going to come after that will depend to a great extent on the continuation of your expertise and the great way you discharge your responsibilities. But you know that the people of this country still have that explorer spirit. They still have that tremendous sense of urgency for the United States to be the leader of the world in this kind of technological advance. So, congratulations again to - for a superb job, and I never fail to marvel at the way you bring these things off. We're all with you and we appreciate what you've done.

PAO That was the Vice President of the United States speaking to the launch team in the firing room -- Firing Room 1 at the Kennedy Space Center. Now Dr. Debus has a few words.

FLETCHER Of course, you here in the firing room deserve all the credit plus all the thousands that are supporting you, wherever they are. But I think that as the leader of the team here at Kennedy Space Center, Kurt Debus deserves a little bit of congratulations and I'd like to turn the mike over to him.

DEBUS Thank you. Mr. Vice President, I'm speaking for the launch team of the NASA Kennedy Space Center and would like to thank you very much for the support you have given us by being here so many times in crucial moments. But you see

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as coolness here is merely external. I assure you internally we are still quite excited. We will continue to give our best to make Apollo 17 and the Skylab a success. We are also grateful that you have decided to select this center for the Shuttle, and since you are almost one of the launch team, we hope that you will be one of the first present here as soon as they get ready for the first flight. Thank you Mr. Vice President.

PAO That was Dr. Kurt H. Debus director of the John F. Kennedy Spacecenter.

END OF TAPE

PAO This is Apollo Control Houston at 51 minutes ground elapsed time. We're standing by. We have begun to acquire data over the Carnarvon pass. We presently show Apollo 16 with an orbit of 97 nautical miles by 91 nautical miles. We'll stand by now for conversations that we'll transcribe between the CAPCOM Gordon Fullerton and the crew of Apollo 16. That data being received was instrument unit data. We now have acquisition of signal with the command module.

CAPCOM Apollo 16, Houston through Carnarvon, over.

SC Bravo Houston. Read you loud and clear.

CAPCOM You're loud and clear also.

SC Okay, Gordie. We're down through on page 217 - 52, and everything is copesetic on all the steps up to that point, and I'll let Ken, well, I've got the numbers here. He marked on stars 23 and 30. It was NOUN 05 with all balls. Torquing angle were plus 040, plus 031, plus 045, and we torqued them at 38:40, over.

CAPCOM Okay, Charlie. We got that.

SC And that torquing angle was just super.

SC And you can even see stars.

CAPCOM Very good.

SC Man this is really something, Gordie.

SC Hey, Gordon. Let me tell you a little bit about the ride.

CAPCOM Okay, stand by one John. We're discussing the booster data here.

SC Okay. Pressure looks good up here.

CAPCOM Roger.

CAPCOM John, this is Houston. If there is nothing startling to report about the ride, we'd better hold off. We're watching, we're evaluating a need for a possible IU nav update and also we're seeing some pressure, over pressure in F module number 2. We'll give you a full story on that over Honeysuckle.

SC Okay, I, no there's nothing really spectacular difference to report on the ride. We'll hold off on that.

CAPCOM Okay.

PAO This is Apollo Control Houston. The rate pressure referred to there was on one of the attitude control engines. Readings here on the ground indicated it's about 100 psi above the normal. We're at 57 minutes ground elapsed time continuing to monitor on this pass. This is Apollo Control Houston.

PAO This is Apollo Control Houston. 1 hour ground elapsed time continuing with the pass over Carnarvon and Honeysuckle.

END OF TAPE

CAPCOM Apollo 16, Houston. Through Honeysuckle.
Over.

SC Go ahead, Gordon.

CAPCOM I'll give you a little story on the S-module problem. Evidently S-Module number 2, which is our one on top of the vehicle. The one that would cause you to pitch away from the earth, the primary helium regulator there has failed to the backup. The backup isn't regulating properly. Normally it should hold around 190 psi. This pressurizes both fuel and oxidizer. And it has gradually increased now up around 320 range and there is a relief valve which will relieve helium pressure at 325 and reseal when the pressure gets down to 225. This should be a gradualize of helium. We'll have a better hack as the stage passes as to when you could expect a deplete. But should you lose control in orbit, go to the procedure on L2-10 for service module RCS control of the S-IVB. Over.

SC Roger.

CAPCOM 16, we're just about to LOS. The pressure shows right - in fact a little bit above the relief pressure. We'll have to wait till the states to get a real good handle on how it's going to deplete. Over.

SC Roger.

PAO This is Apollo Control Houston. At 1 hour 4 minutes ground elapsed time. We've just had loss of signal with Honeysuckle. The problem discussed between CapCom Gordon Fullerton and the crew of Apollo 16 was one relating to the APS, the attitude propulsion system aboard the S4B and it deals with the regulator pressures on one of the APS, APS number 2. The normal reading is around 190 psi. We've shown an increase in the range of 320 psi. This system relieves at 325 psi and reseals once the number backs off to 225 psi. These are helium pressures that are being read. We're now at 1 hour 5 minutes ground elapsed time, and we will switch to Kennedy Space Center for the News Conference which will shortly be in progress.

END OF TAPE

PAO This is Apollo Control Houston at 1 hour 29 minutes ground elaps time. We presently show Apollo 16 at an orbit of 96 nautical miles by 94 nautical miles. When we pick up over our state side pass, we expect to have seen a release cycle with the regulator on the attitude control system mode number 2 before we lost data over Australia. We have been noting an increase in the pressures on APS number 2. The one other point to bare in mind is that one module can control the spacecraft during the TLI burn since the only movement during that burn would be in roll. We're at 1 hour 30 minutes. We're standing by now for acquisition. This is Apollo Control Houston.

CAPCOM How are you doing?

PAO We have acquisition with Texas.

SC Houston, 16. Over.

CAPCOM Apollo 16, loud and clear. Go ahead.

SC Okay. Your 5 by the coast line is under us. It's beautiful, and we're standing by for some words. The spacecraft has been holding attitude, just perfect in pitch.

CAPCOM Okay, John. We'll take a look at the APS module here.

SC Okay.

SC Gordie, why the late acquisition?

PAO This is Apollo Control Houston. 1 hour 33 minutes ground elaps time. An observation we're displeased with on the S4B indicates that the mode has probably not released at this time. We're probably lost one transducer. There is some reason to believe, and we will observe this further, the release valve is very possibly feathering. We'll stand by and continue to monitor. This is Apollo Control Houston.

PAO Apollo Control Houston. At 1 hour 34 minutes -

CAPCOM Go ahead 16.

SC Okay, how are you coming on the pass Gordie?

CAPCOM Okay, I'm ready with the TLI plus 90 and the P37 for lift off plus 8. We're putting together a story and looking at the APS module. No immediate action is necessary so let's get the pass out of the way.

SC Okay, fine. Go ahead.

CAPCOM Okay, TLI plus 90, SPS/G&N. The weight is 66973, minus 054 plus 189. Time of ignition is 004 03 1855 minus 03562 plus 4 balls 1, plus 36007 181 234 002. HA is NA. HP plus 00189 36183 504 36020. Sextant star is 26, 0734. Stand by one. We get a hand over coming up, I'll get the rest in a minute. Charlie, this is Houston. How do you read now.

SC Okay, 5 5 Gordie, go ahead.

CAPCOM Okay, Shaft was 0734 Trunion 151, Orsight star 037, up 257 right 29 minus 2131 minus 16500 10932 34867, and 0 5G time is 023 08 28. Serious and rigal 317 108 005. No ullage. Go ahead.

SC Okay, TLI plus 90 SPS/G&N 66973 minus 054
plus 189 004 03 1855 minus 03562 plus 4 balls one plus 36007
181 234 002 HA is NA. Plus 00189 36183 504 36020 260734 151
037 02 57. Correction, that's up 257 right 29 minus 2131 minus
16500 10932 34867 0230828. Serious and rigal 317 108 005. No
ullage.

CAPCOM Okay read back correct. Ready for lift off
plus 8.

SC Speak.

CAPCOM 00800. Double ET is 7948 minus 165 02206.
Go ahead.

SC Roger. P37 for lift off plus 8. 00800
7948 minus 165 02206, and ready for TLI.

CAPCOM Okay, read back correct and TLI pad time
base 6 predict, 22357. Attitude 179 113 000. Burn time is
543 103730 35589. SEFT attitude is 359 146 319. Extraction is
301 326 041 -

END OF TAPE

CAPCOM 146 319, extraction 301 326 041. R2
aline 1127 1072 5720 and YAW is 001. Go ahead.
SC Roger. Give me Delta VC again.
CAPCOM Delta VC is 103730.
SC Okay, copy. TLI 22357.
CAPCOM Standby 1, CHARLIE.
SC Okay.
CAPCOM And over.
PAO This is Apollo Control Houston at 1 hour
40 minutes ground elapsed time.
SC Okay, 22357 179 113 000 543 103730 35589
359 146 319 301 326 041 1127 1072 5720 001. Over.
CAPCOM Readback is good.
PAO This is Apollo Control Houston at 1 hour
41 minutes ground elapsed time -
SC The pass - what I saw was just super.
The other guys saw Ellington as we went over.
CAPCOM How about that. Say, Charlie. Got an
update to the ordeal monitor numbers on page L-228 and 29.
SC Stand by. Can you speak?
CAPCOM Okay, we got a last minute change.
Standby now. Sorry.
CAPCOM I would like Command Module to accept
for a new vector.
SC Okay, you got it.
CAPCOM Okay, and words on the APS module. It
appears to be operating, not completely normally, but adequately
that we predict that it will be good through TLI and TD and E
without any change of procedure. Over.
SC Outstanding prediction.
CAPCOM Okay, and back to what we started earlier,
on L2-228 Charlie, opposite 56 minutes, change FDAI number 1
to pitch equal 17, change 17 to 16. Over.
SC Okay, go ahead. It was changed to 16.
CAPCOM And next page after the ordeal start
time. Change that to 57 20 rather than 57 even.
SC Okay, ordeal start 57 20.
CAPCOM That's affirmative and then I'm sure
FDAI number 1 pitch equal to 11 rather than 13 inside the
box there.
SC Okay, at 57 minutes, I'm changing that
to 57 20 to start the ordeal and the insured FDA number 1
pitch is at 11.
CAPCOM Okay, and then the blank under there -
manuever to R2 emission attitude is 107 as printed in paren-
theses.
SC Okay, we copy.

CAPCOM That's good. And the CMC is yours.
The uplink is complete.

SC Okay, and we're back in block.

PAO This is Apollo Control Houston, 1 hour 44 minutes ground elapsed time. You heard that prediction on the APS. You heard the crews response, the prediction being that we could go through TLI and transposition docking with no change in procedures. The individual responding with the outstanding was spacecraft Commander John Young. We also received a TLI pad, and let me sort those numbers out for you rather quickly. Our time of ignition for trans-lunar injection burn is 2 hours 33 minutes 34.6 seconds ground elapsed time with a burn duration of 5 minutes 43 seconds. We predict a velocity at cutoff of 35 589 feet per second.

SC Stand by.

CAPCOM Go ahead, we're watching.

SC Okay, Houston, standby for the logic.

CAPCOM Roger.

SC Okay, logic 1 coming on up, logic 2 on up. Mark.

CAPCOM Okay, you're GO for pyro-arm.

SC Roger. Thank you sir.

CAPCOM I'd like to update a procedure, the APS module fail procedure, 1 step in that just in case the prediction is wrong and it does fail to - if you want to get that page out I'll give you a short update.

SC Okay, Charlie's got it.

CAPCOM Okay, Charlie. In the center of the procedure it says DSE command burn mode on, cross that line out, and the one below it that says if successful launch vehicle guidance IU, and after the line that says control PITCH and YAW with THC ROLL with RHC, add keep rate below 210 degrees per second, PITCH and YAW .6 degree per second in ROLL to avoid fighting the other APS module. Over.

SC Roger. We understand.

CAPCOM Okay, that's it.

PAO This is Apollo Control Houston at 1 hour 47 minutes ground elapsed time in Mission Control. Flight Director Gene Kranz is polling his flight control team as to our status for the trans lunar injection burn.

CAPCOM 16, Houston. We're about a minute and a half to LOS. No further updates. Everything looks good. Canary should have their antenna fixed and we should be good as we go through their site. Over.

SC 16, Roger.

END OF TAPE

PAO Apollo Control Houston. 1 hour 49 minutes ground elapsed time. We've had loss of signal with Vanguard. We are standing by now for acquisition with the Canary Island station. This should take place in less than 1 minute. At 1 hour 50 minutes ground elapsed time this is Apollo Control Houston.

CC 16 Houston to Canary.

SC GARBLE.

CC You're a little down in the mud but I think I can understand you.

SC We heard you there before we got the signal straightened out (Garble).

CC Roger. You are clear but weak.

SC Okay, how do you read now, Gordy?

CC Loud and clear, Charley.

SC Okay our sigma strength is up to max now.

CC Roger.

CC 16, Houston.

SC Go ahead. Over.

CC We'd like the H2 tank 3 fans to AUTO. Over.

SC Roger H2 tank 3 fans on AUTO.

PAO This is Apollo Control Houston 1 hour 54 minutes ground elapsed time. We're at a little over a minute away now from loss of signal with the Apollo 16 spacecraft. We'll standby and continue to monitor this is Apollo Control Houston.

CC 16 Houston about 30 seconds to LOS. We should have you through ARIA at 2:22 a couple of minutes later than shown in the flight plan, over.

SC Roger, understand.

PAO This is Apollo Control Houston. 1 hour 55 minutes ground elapsed time. We've had loss of signal with Apollo 16 over Canary. The next ground station to acquire will be Carnarvon at approximately 2 hours 25 minutes ground elapsed time, however, we should pick up the Apollo 16 spacecraft shortly in advance of that time with one of the ARIA aircraft which will be on station as Apollo 16 now proceeds toward the time of ignition for the translunar injection burn. Our clock in Mission Control presently shows that burn time some 38 minutes away. At 1 hour 56 minutes ground elapsed time this is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control, Houston, at 2 hours and 19 minutes at ground elapse time and we're standing by in Mission Control awaiting acquisition with the Aucucuc aircraft who are presently on the station for this pass. It will be during this -- following this acquisition and during this pass that we will have the translunar injection burn. Prior to the burn, the booster of the SIV-B will go into a time base six. This will be 9 minutes 38 seconds prior to the TLI burn and will represent the automatic sequence in the booster leading to the burn itself. We, presently show a TLI ignition time of 2 hours 33 minutes 35 seconds with the burn duration of 5 minutes 43 seconds predicted velocity at cutoff 3 589 feet per second with a Delta-V of 10389 feet per second. During the burn, itself, we will be monitoring data from the instrument unit on the SIV-B, this would be data such as velocity current altitude and a predicted amperge at time of shutdown. This data will come through us, through one of the Aucucuc aircraft. We're at 2 hours 20 minutes at ground elapse time continuing to monitor. We show some 13 minutes away now from time of ignition and this is Apollo Control, Houston.

TRACKING We don't read anything you say but we'll transfer it if it's all right.

CAPCOM Apollo 16, this is Houston through ARIA over.

SC By gosh, loud and clear, there.

CAPCOM And so are you, John. How's everything onboard?

SC Everything looks good, here. We're 10 minutes and 30 seconds for the burn.

PAO Apollo Control, Houston.

SC For time base six.

CAPCON Roger.

PAO Apollo Control, Houston, at 2 hours and 24 minutes at time base six started off on time. We're less than a minute away now from the time of acquisition with Canarvan. Standing by and continuing to monitor, this is Apollo Control, Houston.

SC Hey, Houston, the S-II sep light went o ut on time.

CAPCOM Roger, very good.

PAO Apollo Control, Houston, receiving data now. 2 hours 25 minutes ground elapse time. In the Mission Control Center, Houston, displays are being changed to show the dynamics of the upcoming translunar injection a little more than 8 minutes away at this time at 2 hours 25 minutes ground elapse time, this is Apollo Control, Houston.

PAO Apollo Control, Houston, at 2 hours 26 minutes ground elapse time, 7 minutes away now.

CAPCOM Now and the APS Module is looking good.

SC 16, Roger. Everything looks normal here.
SC Roger. One question on the -- comment on
the primary loop does it look okay to you guys?
CAPCOM Standby, Charlie.
CAPCOM Roger, Charlie. EECOM is happy.
SC Fine.
PAO Apollo Control, Houston, a little over
6 minutes away now from time of ignition, our maneuver monitor
displays mission Control show predicted velocity at shutdown
of 35 593 feet per second. A predicted altitude at time of
shutdown 167.7 nautical miles with a forecast apigee of
266 879 nautical miles. Less than 6 minutes away now from
time of ignition continuing to monitor. This is Apollo
Control Houston.
PAO In mission control center Houston, Flight
Director Gene Kranz now going around the room for a go no
go for TLI. We'll stand by.
CAPCOM 16, Houston. You're go for TLI.
SC Roger, go for TLI.
PAO Apollo Control Houston. 3 minutes away
now from time of ignition. Less than a minute away now from
time of Canarvan LOS. The data will be monitored by the
ARIA aircraft in the area. We're at 2 hours 31 minutes ground
elapse time. This is Apollo Control, Houston.
CAPCOM 16, Houston. We're about LOS Canarvan
handing over to ARIA. We'll watch the booster for you.
Spacecraft is all yours.
SC Thank you, much.

END OF TAPE

PAO Apollo Control Houston, at 2 minutes away now from time of ignition for the translunar injection burn. We should be monitoring data from the instrument unit on the S4B. The ARIA aircraft has acquired Apollo 16. We're at 2 hours 32 minutes ground elapsed time proceeding now toward the time of ignition for the translunar injection burn.

PAO Booster reports the ullage engine have been turned on. We're at 2 hours 32 minutes ground elapsed time.

PAO Mark, 1 minute away from time of ignition. Booster reports all systems proceeding normally. Less than a minute away from time of ignition. 40 seconds away now. Standing by at 2 hours 33 minutes ground elapsed time, this is Apollo Control Houston. Booster says we're go for the burn. 16 seconds away. Booster systems engineer reports ignition on the third stage, the thrust looks good, he says.

CAPCOM 16, we're showing good thrust on the S4B.

SC Roger.

PAO Monitoring data from the instrument unit shows a slow build up in our velocity. The velocity now reading 26,147 feet per second. Booster reports a good stable burn. Mark 1 minute into the burn.

SC Good.

CAPCOM Roger, we're looking good here.

PAO Instrument data shows velocity now reading at 26,932 feet per second.

CAPCOM We've seen GO, the shift thrust looks good.

PAO Displays Mission Control shows our trajectory right down the middle of the plot board, looking good coming up on 2 minutes. Mark 2 minutes since time of ignition.

CAPCOM 16, Houston, at 2 minutes looking good.

SC Roger. Right on in here.

CAPCOM Roger.

PAO 2 minutes 30 seconds since time of ignition. Velocity now reading through the instrument unit 28 840 feet per second.

PAO 3 minutes since time of ignition, velocity now showing 29 956 feet per second. Booster systems engineer reports the burn performance looks real good. 3 minutes 30 seconds since time of ignition, velocity now reading 30 152 feet per second. Mark 4 minutes since time of ignition, velocity now ---

CAPCOM Zero minus 3 now burn time as predicted 5 43. Everything looks good.

PAO Velocity now reading 32 073 feet per second, present altitude 119 nautical miles. 5 minutes since time of ignition, velocity 33 864 feet per second. Present altitude 143 nautical miles. 10 seconds to go, everything still looking good, 35 132 feet per second velocity.

SC (garbled)
CAPCOM Roger.
PAO Booster reports a shut down on time,
guided cutoff.
CAPCOM Roger, looks like normal shutdown and
a guided cut off.
SC That's what it looked like. We're looking
at minus 10 on the Delta VC.
CAPCOM Roger.
PAO Apollo Control Houston at 2 hours 40 min-
utes ground elapsed time, booster systems engineer reports
everything looks good at this time.
PAO We are about 4 minutes away now from
acquisition of Apollo 16 out by the Hawaii tracking station.
Standing by continuing to monitor this is Apollo Control
Houston.
CAPCOM 16, Houston, if it is convenient would
you give us VI cut off.
SC We got your light time, never mind.
Bernie, we broke display on the (garble)

END OF TAPE

CC Okay, Ken we copied that, although you faded out at the end. We'll be up on Hawaii here at 44.

SC GARBLE.

CC Charley you are just about unreadable. Copy that you are in P00 and we're standby for Hawaii after this.

PAO This is Apollo Control Houston at 2 hours 44 minutes ground elapsed time standing by now for acquisition with Hawaii.

CC Apollo 16 Houston through Hawaii over.

SC Houston this is the most spectacular view that you can possibly imagine.

CC Apollo 16 Houston through Hawaii over.

SC GARBLE and your 5 by and it's the most spectacular view I've ever seen.

CC Roger Charlie you are loud and clear.

SC Okay, Houston the correct 02 is coming on, we're pumping her up right now.

CC Roger.

PAO Apollo Control Houston 2 hours 46 minutes ground elapsed time. We are now receiving radar data through Hawaii. We presently show Apollo 16 at an altitude of 756 nautical miles.

SC Okay Houston I'm going to OMNI CHARLIE.

SC Gordie, you got Omni Charlie? Over.

CAPCOM Roger, OMNI Charlie, Charlie.

PAO This is Apollo Control - Houston, 2 hours, 51 minutes ground elapse time. Our countdown clock at Mission Control shows the time of separation is less than 13 minutes away now.

END OF TAPE

PAO Apollo Control, Houston, at 2 hours 54 minutes ground elapsed time. Coming up now on that time when the booster initiates its maneuver to separation attitude.

PAO We presently show Apollo 16 in 1974 nautical miles.

ORION And we are maneuvering to the attitude right now.

CAPCOM Okay.

CAPCOM 16, we see the cabin is up to 5.7 now.

ORION Roger. Thank you sir.

CAPCOM We'd like OMNI Delta, please.

CAPCOM OMNI Alpha now, please.

ORION Say again.

CAPCOM Give us OMNI Alpha, Charlie.

ORION Okay, you got it.

CAPCOM Request OMNI Bravo now, please.

PAO Seven minutes away now from time of separation. We presently show Apollo 16 in altitude of 2620 nautical miles. We are at 2 hours 58 minutes ground elapsed time. Flight director Gene Kranz, is taking a check with his flight control team, for a go, no go, for transposition docking and ejection of the lunar module.

CAPCOM Like OMNI Charlie, please.

ORION Roger, OMNI Charlie.

PAO Apollo Control, Houston, at 2 hours 59 minutes ground elapsed time. We presently show Apollo 16 at 2800 nautical miles and velocity at 26931 feet per second.

CAPCOM 16, Houston, the booster is in attitude of stable. You have a go for T & D.

ORION Roger. We'll give you a call just before we get off.

CAPCOM Okay.

PAO This is Apollo Control, Houston at 3 hours ground elapsed time. Present altitude of Apollo 16 3,004 nautical miles. Velocity now reading at 26,408 feet per second. We are 4 minutes away now from time of -- proposed time of separation. This is Apollo Control, Houston.

END OF TAPE

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PAO This is Apollo Control Houston at 3 hours 2 minutes, ground elapse time. Apollo 16's present distance away from Earth now 3388 nautical miles.

SC Okay, Houston, we're getting ready to arm the pyros, are you ready?

CAPCOM Roger, we're ready.

SC Okay, pyro arm A is armed. And B is armed.

CAPCOM Roger.

CAPCOM Now, that looks good.

PAO This is Apollo Control Houston at 3 hours 4 minutes ground elapse time. Apollo 16 presently at a height of 3703 nautical miles.

SC Okay, we're coming up on 59 40 mark.

CAPCOM Roger.

PAO Three hours 5 minutes ground elapse time. We've had small sep burn.

SC Talkbacks are still gray, you can finish pitching around now.

CAPCOM Roger, John.

PAO Apollo Control Houston at 3 hours 6 minutes ground elapse time. Apollo 16 presently at a distance of 4017 nautical miles.

SC Okay, Houston, you got the high gain?

CAPCOM Roger, Charlie.

PAO Apollo Control Houston at 3 hours 8 minutes now on ground elapse time. We show Apollo 16 at a height of 4435 nautical miles.

SC Okay, Houston, you ought to be getting some TV.

CAPCOM I haven't gotten it yet, we're working on it.

PAO Apollo Control Houston, 3 hours 10 minutes at ground elapse time. The black and white picture is beginning to come in now. Television is now showing -

CAPCOM I got a picture now Charlie and it looks real good.

SC Man, it just looks like a picture book from up here Gordo. We must have a zillion particles along with us.

CAPCOM Rog, John, we see the particles and -- great picture[

SC Hey, is the zoom in too much Gordo -- let me take it out a little bit.

PAO Apollo Control Houston at 3 hours 11 minutes ground elapse time. Apollo 16 now 4851 nautical miles away from the Earth.

SC Panning right now.

CAPCOM Super!

APOLLO 16 MISSION COMMENTARY 4/16/72 2:56 CST MC-30/2

SC Gordo, it looks like Orion is hanging in
there pretty well she looks great.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/16/72 CST 3:06 31/1

SC Super.
SC Well it looks like Orion is hanging in there pretty well. Looks great.
CAPCOM Looks the same to us.
PAO Apollo control, Houston. 3 hours
13 minutes ground elapse time. Apollo 16 presently 5195 nautical miles away from the earth.
PAO Apollo control, Houston. 3 hours
15 minutes ground elapse time. Apollo 16 now 5536 nautical miles away from the earth.
CAPCOM Good afternoon, Houston.
SC Roger, looks like a real smooth join up.
SC Air flow. Okay, we're captured there, Houston.
CAPCOM Roger.
PAO Apollo 16 reporting that they have captured the Lunar Module. We're at 3 hours 16 minutes ground elapse time. We show an altitude of 5 706 nautical miles.
CAPCOM Jim is taking some time in dressing this thing up to get these attitudes right.
SC Okay.
PAO Apollo control, Houston. 3 hours
19 minutes ground elapse time. Apollo 16's present distance from earth 6 246 nautical miles velocity now reading 21 466 feet per second.

END OF TAPE

ORION Okay, Houston we're hard docked.
CAPCOM Roger. Golly (garble)
SC And there is no question when you get
the latches.
SC Yep. Roger, Cap.
PAO 3 hours 22 minutes ground elapsed time
Apollo 16 at 68045 nautical miles away.
CAPCOM John this is Houston.
SC Go ahead, over.
CAPCOM We liked -- noticed the mixing valves
cycling about once every 10 15 seconds. We'd like to give
you a mark at which time we want you to put the tri collar VAP
capped in valve in manual and try to catch the flow rate at
appropriate setting. I'll give you kind of a countdown on
the mark here.
SC Yes, we've been noticing that ourselves.
CAPCOM Okay, flowrate's high and starting back
down. John now all of a sudden we've stopped seeing it,
that it has stopped cycling. You didn't throw the switch
already did you?
SC That's negative we are waiting your mark there.
CAPCOM Well it's just hung up. Just as I said
that. Standby. We like you to cycle some manual back to
auto see if that starts it back down. Over.
SC Okay, you're in manual for about 2
seconds and then back to auto.
CAPCOM Okay. Okay, it's coming down now. Stand
by to put it in manual. Ready, now.
SC Okay, okay you got it right there on
the nail.
CAPCOM I was a little slow on the now, but
leave it there for now and press on with the normal pro-
cedures.
SC Houston, four, we turned the T.V. off
we want to give you a picture of the Earth.
CAPCOM Okay, I'll appreciate that.
PAO Apollo Control, Houston, at 3 hours
27 minutes ground elapsed time. That view of Earth from
a distance of 7500 nautical miles.
CAPCOM Very nice picture, Charlie, we can see
Southwestern United States, lower California. Very nice.
SC Ken's doing all that good work for you.
It's out his window.
SC Gordy, is that color okay for you?
CAPCOM Very nice, Ken. Beautiful color.
SC I'll bet it's good. But you just can't
believe how beautiful it is. See the reds in the desert
down there and Southern United States, Northern part of
Mexico. And from here you see the Great Lakes and the state
of Florida out there. And it's just absolutely something.
SC We're going to go back to work

END OF TAPE

SC And we might be able to get you an S-IVB later on if you got room to get back on the stuff.

CAPCOM Apollo 16, Houston, we'll extend the time on commercial TV lines here if it looks like we'll get some good shots on the S-IVB.

SC Okay, I really haven't worked out the angle to tell you exactly how the sun is going to be. But I have an idea we'll see it pretty nicely from here.

CAPCOM Okay, we'll stand by for it.

SC Just went to auto on O2 T to 3 Houston. We are down to that part in the post dock and check list.

CAPCOM Okay.

PAO This is Apollo Control Houston, 3 hours 31 minutes since ground elapsed time. Apollo 16 is presently at a distance of 8240 nautical miles away from Earth. Velocity now reading 19 445 feet per second.

SC Okay, Gordy, we're down to 2 10 I mean correction 2.0 on the DELTA P and we start an hourly check.

CAPCOM Roger.

PAO This is Apollo Control Houston, at 3 hours 36 minutes ground lapsed time. We presently show Apollo 16 at a distance of 8997 nautical miles away from the Earth. Velocity now reading 18 818 feet per second. Very little conversation with the crew at this time as they are in the process of removing the tunnel hatch and going through their check list prior to separation and ejection of the lunar module. We are at 3 hours 37 minutes continuing to monitor. This Apollo Control Houston.

SC 4

CAPCOM Roger.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/16/72 3:33 PM CST MC-34/1

CAPCOM 16, Houston, in about 30 seconds a couple of non-propulsive vents will open on the booster.

SC Okay, thank you.

PAO This is Apollo Control Houston at 3 hours 40 minutes at ground elapse time. The booster systems engineer reports the S-IVB non-propulsive vent has begun. We're at 3 hours 40 minutes continuing the monitor and this is Apollo Control in Houston.

SC Okay, Houston, the hatch is out.

CAPCOM Roger.

PAO Three hours 40 minutes, ground elapse time. This is Apollo Control Houston. Charlie Duke reports the hatch is out. We presently show Apollo 16 at a distance of 9739 nautical miles from Earth. Velocity now reading 18 277 feet per second.

SC Houston, it looks like number 10 latch is indeed locked -- let me start by saying all of the latches are locked. Number 10 is over the rank, but the handle isn't all the way up flush and we're just going to leave it alone. Thought we would just tell you about it.

CAPCOM Okay, Ken.

PAO This is Apollo Control Houston at 3 hours 46 minutes of ground elapse time. Apollo 16 presently at 10 617 nautical miles away from the Earth.

SC Okay, Houston, the connectors are connected and we got LM power to CSM and system test is okay.

CAPCOM Roger.

SC Yes, Gordy, the old Rover is right where it suppose to be.

CAPCOM That's good.

END OF TAPE

ORION Houston, 16. Capcom this is 16.
CAPCOM Roger, go ahead.
ORION Okay, Gordy, when we pitched around
I'd like to tell you a little bit about something we saw on
the LM. When we were coming around about 30 or 40 feet out
we had a lot of white particles, looked like it was coming
out from around the lunar module. Quite a number of them
and as we got closer it looked like to me that the primary,
most of the particles were coming between the ascent pro-
pellent tank over Quad 1 and this OMNI antenna. It looks
like there was being jettied out from either some out gassing
or something, and we assumed it's mylar, but not convinced
of that.
CAPCOM We copied that, Charlie.
ORION The only reason we comment it is just
seemed like there was an awful lot of them.
CAPCOM Okay.
PAO Apollo Control, Houston, 3 hours 50
minutes ground elapsed time, making that report was lunar
module pilot, Charles Duke. In his discussion with Capcom,
Gordon Fullerton, here in Mission Control.
ORION Okay, Houston, we're ready to procede
with the launching.
CAPCOM Okay, we're standing by.
ORION There's 2 logics on.
CAPCOM Your go for pyro 1.
ORION Roger, Houston. Here comes pyro A, mark.
Pyro B, mark.
CAPCOM Okay, they look good.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/16/72 CST 3:53 36/1

SC Houston, we're ready to get off if you
guys are ready.
CAPCOM Your go for ejection.
SC Okay.
SC Okay, we're off Houston.
CAPCOM Roger.
PAO Apollo control Houston. 3 hours
59 minutes that's Charlie Duke reporting their off the
booster.
SC Okay, Houston. We're doing our maneuver
and we'll tell you as soon as we have a visual.
CAPCOM Okay.
SC Okay, Houston. A post LM injection.
Ejection check list is complete.
CAPCOM Roger, and for your information we're
unable to get lines from Goldstone to Houston for live TV;
however, we're going to record any TV you give us for later
playback, over.
SC We'll do it for you.
PAO This is Apollo control Houston. 4 hours
5 minutes ground elapse time. Our displays presently show
Apollo 16 at 13 310 nautical miles away from the earth.
Velocity now reading 1 683 feet per second.
SC Houston, Casper is out of his bag and
we got the SIVB in the window and the TV is transmitting
pictures of now and if you want to do your maneuver with it,
we'll well clear.
CAPCOM Okay, we copy a go for the S-IVB maneuver.

END OF TAPE

CAPCOM Okay, we copy at GO for S-IVB maneuver.
 SC That's the editing maneuver we're taking about.

CAPCOM We'll start the maneuver about 4:10 GET
 SC Okay.

CAPCOM Apollo 16, your TV down link looks good out at the site, however, we can't see it here in Houston.
 SC Okay, we'll still adjust them then, all good things.

CAPCOM Okay.
 PAO Apollo Control Houston. We're 4 hours 10 minutes ground elapsed time. That was Ken Mattingly responding to CAPCOM Gordon Fullerton. We now show Apollo 16 at a distance from Earth of 14 005 nautical miles with a velocity reading 15 751 feet per second. Booster systems engineer reports the yaw maneuver is in progress.

CAPCOM Mean maneuver, attitude maneuver is in progress now.
 SC Rog, we can see it maneuver. I tell you they never make movies like these.

CAPCOM I would like auto track on the high gain please.
 SC You got it.

CAPCOM Thank you.
 SC Gordy, we lost the monitor picture and we are going to try to power the TV set down and we are going to check all connections. Got a lot of horizontal lines and you can't really make out the images. It started out Okay and while John was taking a picture the monitor picture went out. So we are going to take a look at it. It has a whole bunch of horizontal lines. Looks like maybe multiple images.

CAPCOM Suppose that was a sight. Stand by.
 PAO Apollo Control Houston. 4 hours 14 minutes That was command module pilot Ken Mattingly talking about the television. We now show Apollo 16 at a distance of 14 416 nautical miles, velocity now reads 15 543 feet per second.

CAPCOM 16, Houston, the maneuver is complete. We are standing by for your GO for the evasive burn.
 SC Okay, stand by one.
 SC Okay, Gordy, we are all set. It looks like it's almost 90 degrees to us.

CAPCOM Okay, on the TV problem, we had a good picture out at the site there at the first, but then we started losing signal strength which doesn't really tell us whether anything is wrong with your monitor set or not.
 SC Okay, we are going to take pictures like it's working, you can check it out later.

CAPCOM Okay.

SC And we are all set.

CAPCOM Roger.

PAO Apollo Control Houston at 4 hours 16 minutes ground elapsed time. Booster systems engineer reports he will start with the evasive burn of the S-IVB at 4 hours 18 minutes ground elapsed time.

CAPCOM 16, Houston. Jerome Sound says they are getting a good picture and so your trouble was worth the effort there and we'll start the evasive burn at 4:18 even.

SC Okay, Gordy, thank you. We got another spectacular view of the Earth down here, the polar ice cap and we can see the whole sphere and the United States is absolutely spectacular.

CAPCOM How about that?

SC And the other side we got a crescent Moon. In fact you can see Lake Meade, Gordy, very clearly.

CAPCOM No kidding?

PAO Apollo Control Houston, 4 hours 17 minutes ground elapsed time. Apollo 16 now 15 039 nautical miles away from the Earth. Velocity now reading 15 272 feet per second.

END OF TAPE

PAO Velocity now reading 15 272 feet per second.
PAO Apollo Control Houston 4 hours 18 minutes.
The booster systems engineer indicates he has initiated the evasive burn that's 1 minute 20 seconds in duration.

SC We can see her moving away now Gordon, and she's just slowly picking up a little speed there. The only way you can tell it's moving is against the particles in the background. I don't think you can see those on TV, but it looks like there's a million stars out behind the S-IVB as it moves on.

CAPCOM Roger, John.

CAPCOM Now the evasive burn is complete now.

SC And Roger, as she moves out of sight the old Apollo 16 crew really would like to express their thanks and appreciation to the guys at the Marshall Space Flight Center that gives such a phenomenal ride. Not to mention Boeing Company on the first stage, North American on the second, McDAC on the third, IBM on the IU. It was superb all the way

CAPCOM Okay, John, I'll speak to them, thank you.

PAO Apollo Control Houston at 4 hours 20 minutes ground elapse time. That was spacecraft commander John Young expressing his appreciation of the Saturn V team.

SC We felt -- we know it was leaving and we're sure glad we didn't have to use any of that training he gave us.

CAPCOM Okay, we'll sure do that. He's just about to walk out the door.

PAO Four hours 21 minutes ground elapse time. Mike Waush has worked with the Apollo flight crews in the training of these crews for the powered phase of launch and also --

SC Out there looks like Alaska - up maybe a little farther north is a pretty good swirl pattern -- looks like a pretty good storm up there.

CAPCOM Roger.

PAO During the powered phase of flight Mike Waush is always positioned right next to the capsule communicator.

CAPCOM Now 16, here is a word from the auxiliary CAPCOM here.

AUX CAPCOM Good luck you fellows, take it easy and hope everything works out alright.

SC Kind works Mike. Thank you.

AUX CAPCOM Say again?

SC Thank you for all of your trouble. We sure enjoyed working with you.

AUX CAPCOM It was sure my pleasure John, thank you a lot. Good bye and good luck.

SC Thank you now.

PAO Apollo Control Houston 4 hours 22 minutes.

PAO The voice you just heard was Mike Waush who is being transferred to the Ames Research Center. We are at 4 hours 23 minutes ground elapse time. We show Apollo 16 at a distance of 15 707 nautical miles away from the Earth. Velocity now reading 14 972 feet per second.

SC Again the S-IVB has drifted maybe half a mile away now, so we went ahead and turned off the tube.

CAPCOM Okay.

CAPCOM John, just before you turned the TV off, was the monitor still giving you trouble?

SC That's affirmative.

CAPCOM Okay, thank you.

SC I guess it's about time for little VERB 49 to the B 52 attitude. How does that suit you?

CAPCOM Sounds good.

SC Gordy, I can't get over the view of that Earth. None of the pictures just do it justice -- absolutely beautiful.

CAPCOM We're kind of getting the idea that you're impressed.

SC Man, the thing about it Gordy, is that all of the Southern United States, Mexico, and Florida, and Cuba, and the Virgin Islands down that way -- they're all clear of clouds, it's just fantastic[

CAPCOM Did you take some good pictures?

SC Got some the way we're going we may have to get a reload before we get to the Moon.

SC As a matter of fact, you can see as far north as Lake Michigan and Lake Superior.

CAPCOM Sounds great!

SC And all the way down past the Yucatan and into the Central America.

END OF TAPE

SC Houston we've got the cabin back up some
now and our LM-CM Delta P gauge is reading .6. And that is
probably due to the Delta on the cabin. And the O2 flow
high light is going out, so things are getting back to normal.

CAPCOM Okay.

SCAnd, And, Houston, we've done a LM-CM
Delta P, and the time 4 hours and 30 minutes, we had a plus
.6.

CAPCOM Roger.

ORION Houston, we're going to take the waste
storage valve to vent this time.

CAPCOM Roger, Ken.

PAO Apollo Control, Houston, at 4 hours
37 minutes, ground elapsed time. Our space digitals dis-
play in Mission Control, presently using the Moon as a re-
ference and we show that Apollo 16 is 174,639 nautical miles
away from the Moon. At 4 hours 37 minutes, continuing to
monitor, this is Apollo Control, Houston.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/16/72 CST 16:33 40/1

CAPCOM 16, Houston. Don't know if you can see
it or not, but we've started the locks dump on the S-IVB.
SC We lost it a little while ago, Gordie.
CAPCOM Rog.
PAO Apollo control Houston. 4 hours
40 minutes ground elapse time. The booster systems engineer
reports that the locks dump has been completed with the
S-IVB. We're at 4 hours 41 minutes ground elapse time con-
tinuing to monitor. This is Apollo control, Houston.
SC Houston, are you ready for us to start
charging battery B?
CAPCOM Okay we're Go for battery charge B and we'd also
like you to dial in the flight plan high gain angles minus 47
and 98 and go to REACQ.
SC Okay, you got the angles and your going
to REACQ.
SC Houston, 16.
CAPCOM Go ahead.
SC Okay, we got Bat B charging and it says
volts should be 37 1/2 to 39 1/2 and I'm looking at 33.
CAPCOM Okay.
CAPCOM Charlie, we got - we figured about
8 1/2 hours out of that battery so it will be awhile before
the voltage gets back up and EECOM thinks that's okay.
SC Okay, fine.
SC Houston, we got 3.4 on 7A we going to vent
battery to zero if that's okay.
CAPCOM Stand by.
CAPCOM We'd like you to hold on that for a
minute.
SC Your too late we just vented it.
SC Okay, it's reading about 2 tenths right
now.
CAPCOM Roger.
SC Say again, 4 tenths.
CAPCOM 4 tenths.

END OF TAPE

PAO Apollo Control, Houston, 4 hours 15 minutes ground elapsed time. The space digitals display is still using the Moon as a reference. We presently show Apollo 16 at a distance of 172--173,082 nautical miles away from the Moon. Continuing to monitor, this is Apollo Control, Houston.

SC Houston, we've got a couple of comments on the EMS for GMC, whenever Reese has a break.

CAPCOM They're all ears, go ahead.

SC That must look funny. Okay, we been running an all bias test here for well since we got in orbit and each time the check list calls for it. The first one we found it in hundred checking, checking gain 2.5 and just before docking it got 2.6 and I just ran another one and I had 2.8 and I don't really know what you can do with that, but I just thought I'd go ahead and tell you about that magnitude of what we're looking at. Okay and out first rough guess of how the SCS GDC system is performing it looks like it's well within spec, in PITCH, YAW and ROLL. (garble) as drift measurements go.

CAPCOM Okay, counting, John, we get that.

CAPCOM 16, Houston, whenever you're ready, we're ready to load the GDC REFSMMAT.

SC Okay, you have POO and ACCEPT.

CAPCOM Okay. Ken, sorry about that we didn't get coordinated here. We don't have an uplink site, so go back to blonk until after 5 hours and we'll try it again then.

SC Alrighty. We're backing up to (garble) the block. And we're going to kind of hanging up here for awhile any how while we get our suits off and if it turns out to be a pretty interesting operation (garble)

CAPCOM Roger.

SC I'll tell you, Gordy, there were some sights out there that were really something. One of the, one of the things, most things happened like most people said they would. But there were a couple of things that we had never seen or heard anyone even mention them, maybe they been there all along. One of the things that was really nifty was while we were in power flight both in later stages of the boost and during the TLI burn, there were particles that I could see out the windows, that were going past us in the plus X direction and I kept thinking that, that was an optical illusion, and I kept going back and looking at it again and sure enough. And these were after we were in steady state it wasn't around any kind of staging event or anything that I was aware of.

CAPCOM Oh, how about that one, haven't heard of that one before.

SC Then when we, when we scooted out here and you started your nonpropulsion bend, we could see, first it just looked like it was a little mist around the outside when you looked at the sun. And then the sun hit it at such an angle that you started getting a spectral reflection that looked like a rainbow out over the LM. And then after that you could look out my number one window and apparently the lighting was just (garble) so that you had a heavy appearance of light streaming off into a point source and infinity. There was a little blank spot in it and it what looked like the origin, then all these streaks were coming back towards you like you were right in the center of a cone and these things would change color, they would go to a light purple, then they had a little sandy color to them, that was another one that I don't remember hearing before and maybe it was just the lighting, but it sure was pretty.

CAPCOM Rog. Enjoyed the description.

SC And I'll tell you, you can't wait to many years to make this worth it.

CAPCOM Roger.

SC Gordy, on that boost, that S-IC is a real freight train. And I'll tell you boy, I can't get over that.

CAPCOM Roger.

SC See that thing on the T.V. up through staging.

CAPCOM I didn't watch it all the way till it went out of sight I'll have to check here.

PAO Apollo Control, Houston---

CAPCOM We saw an even tower jett.

SC Good show. John is in the middle of his suit-off.

CAPCOM Okay.

PAO We're at 4 hours 58 minutes, ground elapsed time. Most of that long discription coming from Ken Mattingly, how---

SC Suggestion we wrote in the flight plan to be sure and take a look at the fires out there in Africa as we went over which is something we probably would have forgotten or never even thought of.

END OF TAPE

SC Beautiful as everybody has said they could be. They are just all over the place. All these little yellowish red dots down there. And it looks like some low overcast in parts of the area or maybe from our altitude, maybe it was a high overcast. It looked like looking in the lights of a city through fog and then there were others that were clear. Something well worth remembering to look for.

CAPCOM Roger. I'll be sure to remind Ron to look for that one.

SC I tell you, God didn't equip us with enough eyes to see everything there is to see in the first hour.

CAPCOM Rog.

PAO Apollo control, Houston. 4 hours 59 minutes. That last remark coming from Command Module pilot Ken Mattingly. Our space digital display still using the moon as a reference. We show Apollo 16 172 048 nautical miles away from the moon.

SC Gordy, it looks like this whole operation may take us longer than we guessed. Is there any thermal constraint on getting 52 attitude to go on to those other attitudes? Looks like (Garble) . . .

CAPCOM I'll check on that Ken.

SC . . . wondering if that's something we ought to keep in mind.

CAPCOM Okay, we're about to hand over here. I'll check on that and come back through Hawaii.

SC Okay, thank you.

CAPCOM 16, we through Hawaii, now. And your scheduled in this attitude through 7 hours at least so no problem thermally and your not even due to do the P52 for another half hour, so your plenty ahead.

SC Okay, that P52 we're going to cut to see point here pretty soon to see - you want us to do that than we'll pick up the suit doffing after that or I'd just as soon go ahead and get all the suits out of the way and we can do the 52 on schedule or we can do it after we get the suits off. Does it make any difference to you folks?

CAPCOM Let me check.

CAPCOM If that's what you would like to do why don't you go ahead with the - finish up the suits no problem slipping the 52 a little bit. And we'd like go and accept with that uplink.

SC Okay, there is go and accept. Is Fredo still around there?

CAPCOM No, he went home about a half hour ago.

CAPCOM 16, Houston. The computer is yours.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/16/72 CST: 17:03 GET 5:07 43/1

PAO This is Apollo Control Houston at 5 hours 10 minutes ground elapsed time. Our displays still show the Moon as our reference so we show Apollo 16 at a distance of 170 878 nautical miles away from the Moon and we've had no conversation for a while with the crew of Apollo 16. We suspect they are in the process of doffing their space suits and later preparation for their eat period which is scheduled to begin at 6 hours ground elapsed time. 5 hours 10 minutes ground elapsed time this is Apollo Control Houston.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/16/72 CST 17:13 44/1

DEAD AIR

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/16/72 17:23 CST 5:27 GET MC-45/1

PAO This is Apollo Control Houston at 5 hours
30 minutes ground elapse time. Our space digital display now
using the earth reference. We show Apollo 16 at 23 892 nautical
miles away from the Earth. Velocity now reading 12 295 feet
per second.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/16/72 CST 17:33 GET 5:37 46/1

PAO This is Apollo Control Houston at 5 hours 44 minutes ground elapsed time. We presently show Apollo 16 at a distance of 25 488 nautical miles away from the Earth. Velocity now reading 11 945 feet per second. Very shortly in Mission Control we will have the change of shift - or shift change over of the Gene Kranz team of flight controllers will be replaced by the Pete Franks team of flight controllers. We're at 5 hours 45 minutes and continuing to monitor. This is Apollo Control Houston.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/16/72 17:43 CST 5:47 GET MC-47/1

PAO This is Apollo Control Houston, 5 hours 50 minutes ground elapse time. We presently show Apollo 16 at a distance of 26 143 nautical miles away from the Earth. And traveling at a velocity of 11 796 feet per second. We're continuing with our shift turnover in the Mission Control Center at the present time. Pete Franks' team of Orange Flight Controllers coming aboard replacing the Gene Kranz team of Light Flight Controllers. We estimate the start time of our change in shift news conference 6 to 6:15 p.m. Central Standard Time. The news conference will involve Flight Director Gene Kranz. CAPCOM astronaut Gordon Fullerton and booster systems engineer Frank Van Rensselaer. This news conference will be held in the news center briefing auditorium -- in the news center briefing auditorium instead of the large public affairs auditorium. We are at 5 hours 51 minutes ground elapse time. This is Apollo Control Houston.

END OF TAPE

SC Hello, Houston, 16, John and I are back up now.

CAPCOM Roger. That uplink is complete in case you didn't hear me sometime ago. The computer is yours.

SC Okay, we're in block and it took us about an hour for me and Charlie to climb out of those suits and stow them. It's really something.

CAPCOM Rog.

CAPCOM 16, Houston.

SC Go ahead, Gord.

CAPCOM I'm going to hand over to Pete here, he's coming on with a good boost there. He's got a bunch of P-37 pad and a bunch of Flight Plan updates for you when he gets somebody free to do some stenographic work there. Enjoyed the first 6 hours, hope the rest of it goes as well.

SC Gordon, that was beautiful. Tell flight and the guys down in the trenches that it was super.

CAPCOM Okay.

END OF TAPE

SC Okay, Houston 16 here we're ready to copy the flight plan updates.

CAPCOM Roger, 16 at 11 hours in the flight plan.

SC Stand by.

SC Okay, go ahead.

CAPCOM Roger, at 11 hours we want to delete waste stowage vent valve close and at 12:15 we will add waste stowage vent valve close.

SC Okay, copy add at 12:15 waste stowage vent valve close.

CAPCOM Roger, and delete it at 11.

SC Okay, go ahead.

CAPCOM Roger, then we've got change to the CSM experiments EVA check list having to do with the ultraviolet filter. UV filter apparently did not meet the specs and we're going to have to make some changes to the exposures that on several different pages in the check list.

SC Yes, we'll wait on that we don't have that check list out yet, pete.

CAPCOM Okay, and I've got P37 block data.

SC Stand by.

SC Okay, Pete go ahead with the P37 block data.

CAPCOM Okay, liftoff plus 15 it's 015 00 5493 minus 165 046 40.

SC Roger, copy. 015 00 5493 minus 165 046 40, over.

CAPCOM Roger, that's correct John.

SC Is that all?

CAPCOM I (garble) that's all.

SC How's midcourse looking?

CAPCOM Stand by, one. We're still looking at it, it looks pretty good right now.

PAO This is Apollo control. We've now completed our shift hand over in Mission control. Flight Director Pete Frank and the orange team of flight controllers. The capcom on this shift is astronaut Donald Peterson. We have a change of shift press briefing scheduled to begin momentarily in the MSC news center briefing room as is our normal practice during change of shift briefings we will have the air to ground line down and we'll be recording any conversations with the crew for playback following the press conference. The coming 8 hours or so should be a relatively quiet time for the crew. The booster engineer has pretty well taken care of all activities with the Saturn V third stage of the S-IVB. That vehicle is now gradually separating from the spacecraft tumbling slowly. This is to maintain the proper thermal equilibrium and also to kind of neutralize out any changes in velocity added or subtracted by small ventings from any of the tanks. A normal procedure with the S-IVB.

APOLLO 16 MISSION COMMENTARY 4/16/72 CST 18:03 49/2

PAO The crew is scheduled to begin a eat period and as we passed up to Charlie Duke we do not expect to have midcourse correction one based on the current tracking data. At 6 hours 19 minutes Apollo 16 is traveling at a velocity of 11 159 feet per second now 29 187 nautical miles from earth. This is Apollo control, Houston.

END OF TAPE

PAO This is Apollo Control at 6 hours 41 minutes. During the change of shift briefing we accumulated a small amount of tape conversations which we'll play back for you at this time. And then continue to stand by live following that tape playback.

SC Houston, air to ground are you ready?

CAPCOM In a minute 16.

CAPCOM Okay, 16, you can go ahead and cover.

CAPCOM 16, Houston.

SC Go ahead.

CAPCOM Roger. Just wanted to remind you. Before you start to the UV photography, we've got to change all of the exposures.

SC Okay.

SC Pete, 16 here. Go ahead with the update. Give me a page number for the UV, and we'll update the shutter setting.

CAPCOM Okay, we've got a whole bunch of pages. We'll start on 2-16.

SC Go ahead.

CAPCOM Under item 4 we want to change from 20 seconds 2 frames to 2 seconds 2 frames.

SC Okay, keep going.

CAPCOM Okay, on page 2-17. Item 4, 20 seconds 2 frames changed to 1/15 second 2 frames.

SC Okay, 2-16 line 4 20 seconds to 2 seconds. And 2-17 same line is 1/15 verses 20 seconds.

CAPCOM That's affirmative and on page 2-19 we want to change shutter under item 5--we want to change shutter 1/15 2 frames to shutter 1 2 frames.

SC Okay, shutter 1/15 went to shutter 1 2 frames.

CAPCOM Roger, and on page 2-21 we have changed from shutter 1/15 2 frames to shutter 1 2 frames.

SC Okay, that's item 2?

CAPCOM Affirmative, that's item 2.

SC Okay, that was shutter 1 (garble) 1/15.

CAPCOM Affirmative. And on page 2-22, item 2. Change shutter 1/15 to 2 frames to shutter 1/2 2 frames.

SC Copy, 1/2.

CAPCOM On page 2-23, item 4, 20 seconds 2 frames to 2 seconds 2 frames.

SC Okay, copy.

CAPCOM And on page 2-24, under at T start plus 7 minutes, change 20 seconds 2 frames to 1/15 second 2 frames.

SC Can you say where that is again?

CAPCOM Okay, it's on page 2-24, and it's under the heading that says at T start plus 7 minutes.

SC Okay, what was it, I'm sorry, I got all of that, but didn't get what it was.

CAPCOM Okay. It's change 20 seconds 2 frames to 1/15 second 2 frames.

SC Okay, copy.

CAPCOM Okay, and on page 2-36, about 1/3 of the way down the page where it says configure lens F8 1/30 4 - we want to change that to configure lens 1/2 stop between F 5.6 and F8, 1/15 and 4.

SC Okay, that's 1/2 stop between F 5.6 and F 8 shutter to 1/15.

APOLLO 16 MISSION COMMENTARY 4/16/72 18:36 CST 6:40 GET MC-50/2

CAPCOM That's affirmative, John.

CAPCOM And on that same page, about 2/3 of the way down, under the step that says electro(garble) power ON, we want to add a note to hold for instructions from MSFN.

SC Understand -- hold for instructions from MSFN -- is that before power ON?

CAPCOM Negative, that's immediately after power ON, and I won't read you that instruction now, we'll wait until we get to that in the flight plans.

SC Okay.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/16/72 CST 18:45 GET 6:50 51/1

CAPCOM 16, Houston.
SC Go ahead, Houston.
CAPCOM Roger on this verb 49 thats at 7 hours
in the flight plan. We want you to hold up on that so we
can have a look at the attitude.
CAPCOM 16, Houston. We had a temporary very
short loss of com there did you do anything onboard to return
com?
SC We haven't touched a thing there, Pete.
CAPCOM Roger, everything seems okay, now. It
was very brief, but we lost it for a while.
SC We didn't hear any squelth or any of that
noise what you usually get when you loose com.
CAPCOM Roger, understand.
CAPCOM 16, Houston. The attitude in the flight
plan for verb 49 is okay. You can go ahead with it.

END OF TAPE

PAO This is Apollo control at 7 hours 3 minutes. The spacecraft will shortly be maneuvering to the proper attitude to take a series of ultraviolet photographs of earth using the electric Hasselblad camera which is mounted in the right side window of the command module. We expect that as the spacecraft maneuvers we'll lose lock with the hi-gain antenna and communications will probably momentarily drop out or become quite noisy until we reestablish solid lock on. The crew by this time should have completed their what would amount to lunch. Their coming up now on the series of ultraviolet photographs of earth and this is an experiment which gathers ultraviolet photos both of the earth and later of the moon for studies of planetary atmospheres. Also prior to what will amount to their evening meal or dinner the crew will be doing a series of midcourse navigation sittings and also will be changing the lithium hydroxide canister and setting the spacecraft up in a passive thermal control mode a slow rotation of about three revolutions per hour to maintain the proper temperature equilibrium. At the present time we show Apollo 16 33 696 nautical miles from earth spacecraft velocity 10 358 feet per second.

END OF TAPE

SC Houston, 16. Over.
CAPCOM Go ahead, 16.
SC Okay, Pete, I think we've figured out what all this white particles is coming off the LM. On the the side of the LM that's between - OMNI antenna and the accent propulsion propellant tank. There is a surface that was gray that is now for some reason the thing is all stripped looking, it's the surface that's really almost perpendicular - parallel to the plus X of the LM. And it's all tattered and torn and shredded looked like shredded wheat is what it reminds me of. Over.

CAPCOM Roger, copy.
SC And that is the only surface we have that looks like that and we continually get particles shredding off of that.

CAPCOM Roger, copy.
CAPCOM Charlie, we're having a little trouble figuring out which surface your talking about. Can you give us a little better description of what you were talking about there.

SC On the plus X side on kid side. The surface right below the docking target that runs parallel to the plus X of the LM and right into the top of the aps propellant tank.

CAPCOM Okay, right below the docking target and it runs right into the top of the aps propellant tank.

SC That's affirm. And that axis is almost parallel to the plus X axis.

CAPCOM Roger.

SC And whatever that surface was is all shredded and as I said like shredded wheat and it's continually spitting particles off.

CAPCOM Okay, in other words you can see it deteriorating now.

SC That affirm, it's spitting particles off about five or ten a second.

CAPCOM Roger.

CAPCOM Okay, 16, we're going to take a look at it now.

SC Okay.

CAPCOM And, 16 we've got a correction to the GNC check list page 9 dash 4 whenever you get ready to copy.

SC Let's catch that after the UV photos.

CAPCOM Rog, will do.

END OF TAPE

SC Roger, will do.
PAO This is Apollo Control, at 7 hours 22 minutes. At present time the LM systems engineer is going through the handbook to try to pin point the precise location that Charlie Duke was describing on the lunar module. Charlie said that they appeared to have found the surface that is giving off the particles that were reported earlier. He said that they can see about 5 to 10 particles per second, shedding off of surface where the coating appears to have degraded, as best we can tell from his description. He says the surface looks like shredded wheat and it's giving off particles at the present time we haven't pin pointed precisely what location he's talking about although we expect the LM systems expert engineer will come up with that location from the description shortly. And then the procedure will be to determine what if any effect the loss of that coating might have. Presumably the concern if any exists would be for thermal considerations. Most of those coatings are on there to maintain the proper temperature conditions within the vehicle.

CAPCOM 16, Houston

SC Go ahead.

CAPCOM Roger. On panel 382 the primary glycol evap. inlet temp valve, we want to adjust it slowly to get that temp to about, to evap out to about 45 degrees. You'll have to with them.

SC You want us to go to the manual and set the evaporator, set the temperature to a 45 with a manual. Will we have the water boiler going, is that correct?

CAPCOM That's affirmative.

CAPCOM 16 go ahead and set it, move it toward maximum, you will have to go pretty slow with it.

SC Okay, can we stand by just a minute.

CAPCOM Affirmative.

SC Thank you. I've got to open up that panel and all that stuff.

CAPCOM Roger.

END OF TAPE

CAPCOM 16, Houston, can you go manual on high gain?
SC Roger.

CAPCOM Charlie was in reac and it was drifting
around.

SC Okay, it is in manual now.

SC Rog, again.

PAO This is Apollo Control at 7 hours 38 minutes.

We appear to pin down on the diagrams a little more precisely where the thermal skins that Charlie Duke described shredded and spitting off particles are located. Perhaps the best way to describe this would be to ask you to visualize the Lunar Module as if you were looking at the ascent stage of the LM facing the porch -- the front porch -- or the part of the LM that looks like a face, and visualize the docking target, which is on an upper surface slightly behind and to the left of the commander's position. The panels extend downward from this docking target would involve several square feet of surface area downward to the bolbus tank that is underneath thermal skins and that pertrude from the right side of the Lunar Module. We have very little data on the Lunar Module at the present time. The only data that we're monitoring is the amount of power being transferred from the Command Module to the Lunar Module. So we have very little information to go on in assessing what the affect might be. As I mentioned previously, the primary purpose of these skins, which are generally consist--although they vary from place to place on the LM--generally consist of layers of coated mylar capton, which are thin plastic-like materials -- the sole purpose of which is to maintain the proper temperature conditions for the equipment tanks and so on that are underneath. Among the equipment underneath this section of the Lunar Module, is RCS system A, oxidizer and helium tanks -- we understand also there is a water tank in that area. We are investigating or discussing the possibility that a leaking tank might have something to do with shredding of the material -- I think that the primary concern at this time is what is causing the material to shred. Among the things that have been discussed are turning the TV ON, getting the people on the ground a look, the response that Flight Director Pete Frank got to that suggestion was it probably wouldn't do us a great deal of good, although that one is still an open possibility. And the LM systems engineer is continuing to evaluate the situation and we'll be coming back with additional recommendations. At the present time Apollo 16 is 37 181 nautical miles from Earth. The spacecraft velocity is down now to 9826 feet per second.

SC Houston, is that close enough on that evap temp -- looks like I can't hit 45 -- I can hit 43 or about 46 or 7.

CAPCOM (garble) 16, that looks good enough.

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CAPCOM 16, Houston, on this panel that you were looking at that the particles are coming off of, that's not a hard piece of structure there, that's just a thermal protection covering a standoff that's holding up in the RCS A system tanks. And all of the RCSA tanks are under there, and what we're concerned about ---

END OF TAPE

CAPCOM --that you were looking at, the particles are coming off of. That's not a hard piece of structure there, that's just a thermal protection covering, stand off, that's over the top of the RCS A, system tanks and all the RCS A tanks are under there and what we are concerned about is one of those tanks may be leaking and effecting the thermal protection blanket on top.

SC Okay.

CAPCOM Okay, we are considering the possibility of taking a look at the tank systems.

SC I'm not sure. The picture we are trying to paint here is like you had painted something and then all the paint started to peel off. It's all stripping up like a - like you painted an old barn and had the paint come off of it. And it is all standing out, you can see it - kinda releasing from the surface. I don't know if that paints you a picture or not.

CAPCOM Roger, I think that's the way we understand it. Are you still getting those particles coming off pretty fast now?

SC They are not coming off as fast as they were a while back, but maybe that's our sun angle has changed to make them look quite obvious.

CAPCOM Roger.

PAO That last description came from Ken Mattingly. Ken describing the appearance of that thermal skin as looking like an old barn in need of paint, where the paint or whatever the coating is, is lifting up and kinda peeling back.

PAO And systems engineer who has done a bit more digging into the nature of the skins at that portion - at that part on the LM describes it as an aluminum skin about 4 mills thick and painted. So that would go along with the crews description of the peeling. This, as we mentioned previously, the skins at various portions on the LM differ typically they would be the mylar type of material, but there are also skins that are aluminum.

SC Hey, Don, we're ready - looks like we ought to be deactivating the primary evaporator or did you want us to keep it on for a while or something?

CAPCOM Ah, negative Ken, you can go ahead and shut it down. Stand by for a minute.

SC Alrighty.

SC Okay, Don, we've got the evaporator secured.

CAPCOM Roger, copy.

CAPCOM 16, Houston. On that panel 382, the manual control, the mixing valve, looks like we are going to

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CAPCOM have to play with that valve every time
we change attitudes so you might just leave that panel open
or closed, one or two of the fasteners so it will be easy to
get into.

SC Okay. Looks like that is going to be fun
around the moon doesn't it.

CAPCOM Rog.

CAPCOM We are looking at that right now Ken.

SC Alright.

END OF TAPE

PAO This is Apollo control at 8 hours 5 minutes. Apollo 16 at the present time is maneuvering into the proper attitude for calibrating the optics system that will be used in a series of star sightings. These are taken routinely on the transearth and translunar legs of the flight. The information is fed into the onboard guidance system and is used to update the onboard systems knowledge of so called state vector. The trajectory - of the vehicle is currently on and this data is then compared with the ground figures. And as the spacecraft maneuvers into this attitude we loose lock with the hi-gain antenna and have momentary drop out in communications. Again to reiterate the description that we have gotten from the crew what appears to be paint peeling from a portion of the lunar module thermal skins about 45 minutes ago or about 7 hours and 17 minutes Charlie Duke came on the circuit to describe the location of the lunar module from which a series of white particles that have been described earlier as drifting past the command module appeared to be emanate from. He said it was on the side fo the lunar module between the OMNI antenna and one of the LM tanks. And had the appearance of skin that was torn or shredded. With particles coming off at a rate of about 5 to 10 per second. The initial reaction here in the control center that was one of the mylar or kaptom skins which is stretched over the lunar module surface for maintaining the thermal control proper temperatures within the vehicle had shredded and it was these particles coming off. This is very fragile material physically and since the lunar module does not have to withstand aerodynamic forces these surfaces can be very light weight and consequently are quite fragile. The initial concern was from what had shredded the material. Later Ken Mattingly gives a further description and also we coupled that with information from the LM systems engineer here in the control center. Ken's description was that the material appeared to be paint peeling back from a hard surface the LM systems engineer verified that the skins at that point on the lunar module are very thin aluminum. He said that they were four mills thick and are painted which would indicate that the skin itself the aluminum structure is not damaged, but the paint which is also on there for thermal purposes is apparently peeling back. At the present time we're continuing to evaluate what affects that might have thermally on the equipment beneath the area. The panels the thermal skins are over RCS system A one of the two RCS systems tanks. The oxidizer tank, helium tank and also water tank was reported in that area. One of the things that has been discussed and is still under consideration is the possibility of having the crew enter the Lunar Module and power it up enough to give us a look at some of those systems and perhaps allow us to draw

AFOLLO 16 MISSION COMMENTARY 4/16/72 CST 19:58 57/2

PAO some further conclusions as to what might
be happening. And as we mentioned previously the only
measurements that we have on the lunar module at the present
time are the power measurements. We're monitoring the amount
of power that is being supplied from the command module to
the lunar module.

CAPCOM 16, Houston. Go to high gain.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/16/72 CST 20:03 GET 8:08 MC-58/1

CAPCOM 16, Houston, go to high gain.
SC 16, go high gain.
CAPCOM 16, Houston, give us a high gain antenna.

END OF TAPE

PAO This is Apollo Control at 8 hours 15 minutes.
The LM systems engineer has --

CAPCOM Roger 16, you're loud and clear.

SC Roger, I see something coming off of the Lunar Module now, but I haven't been up here looking out the window. I just noticed it looks like it's coming out of a vent or something. From looking at it through the window, it is beneath this sheet that's sort of shredded off, and it's right between the -- that spiral antenna, and above the big APS tank. But this is definitely coming out in a stream right now, looks like, and not very many particles, but they're just being propelled away from the Lunar Module at some velocity.

CAPCOM Okay, Rog, let's get in there and take a look at it. And Roger, I think we're going to have to get into the LM and take a look at the RCS systems gauges to tell what's going on here. Do you notice any color or anything more descriptive about that stream?

SC Well, my opinion of the color is that it's a brownish material.

CAPCOM Roger.

SC And some of it has long flakes to it, and but some of it is just little particles.

CAPCOM Roger.

CAPCOM 16, we would like to have a look at the LM C and Delta P before you start pressurizing it also.

SC Okay, do you want us to stop the B 23 and go in there right now? Over.

CAPCOM That's affirmative, 16.

SC Okay. Do you want us to stay in this attitude, Pete?

SC And Pete, you might be thinking about what kind of a -- where you want us to enter the checklist.

CAPCOM Roger, I understand. We'll get back to you in a minute, Charlie.

SC Rog, the activation checklist, I guess.

CAPCOM Roger.

SC We're up to 6/10 on the LM C and Delta P which is what it was due to our cab pressure difference. I don't think it has leaked any.

CAPCOM Rog, we copied, and Charlie we want to start on page 2-1 in the activation checklist.

SC Okay. (garble) if I go to wider deadband.

CAPCOM First of all Ken, we want a roll to 91 degrees and that'll bore site the AFT OMNI toward the Earth, and also we want the waste storage vent valve closed.

SC Okay, now, take it a little slower here. You want to do a maneuver to a roll of 90. That's Affirm?

CAPCOM A roll of 91.

SC Okay, do you want the other attitudes to be

SC the same as I have now?
CAPCOM That's affirmative. That's affirmative 16.
SC Okay, I have 9100 and we use the present
pitch and present yaw and you get the waste vent close.
CAPCOM Roger, the waste storage vent closed.
SC We've done that. Okay, we're starting our
maneuver now.

PAO This is Apollo Control at 8 hours 20 minutes
and the import of that last series of exchanges with the crew,
as we are instructing them to enter the Lunar Module and we'll
power it up sufficiently to look at some of the systems and
try to determine from the data what, if anything out of the
ordinary, is happening. The additional description that we
got a minute or so ago was from John Young. John described
the particles coming off as on further evaluation to have the
appearance of some sort of a vent. He said that the material
appeared to have a brownish color, and appeared to be propelled
away from the Lunar Module with some force. He said that it
was coming out in a stream, sometimes particles and sometimes
as longer streams. And the main thing that we'll be looking
for when the LM is powered up is the propellant pressures and
temperatures particularly in that area of the Lunar Module.

END OF TAPE

SC Okay, Houston we're opening the LM
pressurization valve now.

CAPCOM Roger.

SC How does it look?

PAO It appears at this point that the crew
is opening the LM hatch total time probably would be around
15 minutes from the time they started the procedures of get-
ting into the LM until they're in and began turning on some
of the switches so that we can look at those lunar module
systems.

CAPCOM Ken, we're also trying to get some TV
looks at that venting condition if it doesn't interfere with
the activation.

SC Okay, I tell you what we've stowed the
camera afterwards wait until they get in the LM and then I'll
go down and get that thing out. I can do that while their
going in there.

CAPCOM Roger, understand.

PAO Both, Charlie Duke and John Young will
be entering the Lunar Module they're in the process of doing
that right now, and at the present time Apollo 16 is
41 141 nautical miles from earth traveling at a speed of
9 298 feet per second. We have asked Ken Mattingly to get
out the TV camera and we expect that once Duke and Young are
in the Lunar Module cleared out of the way so he can get to
the area where it is stowed that he will get it out and we
would expect to get a TV picture hopefully showing the area
of the Lunar Module where the particles are coming from.
And shortly after that we should also get some data from the
Lunar Module which if of course the thing of greatest interest
to the controllers here in mission control, particularly they
are interested in looking at the propellant pressures and
temperatures of RCS system A which is in the vicinity of the
lunar module where we're seeing the materials - particles
emanating.

CAPCOM 16, can you zero the optics all you have
to do is hit the switch. It's within 10 degrees.

SC Okay, Houston, how far along in this activa-
tion would you like us to go?

CAPCOM Standby a minute, Charlie.

CAPCOM Step 7, Page 2 dash 3. 2 dash 3
step 7.

CAPCOM Go to 2 dash 3 step 7, Charlie.

SC Okay, we start on 2-1, right.

CAPCOM That's affirmative.

PAO This is Apollo control at 8 hours
33 minutes and that last transmission from Charlie Duke indi-
cates to us that Duke and Young are in the Lunar Module
going through the activation checklist at the present time

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PAO getting the LM partially powered up so that we can get a look at some of the critical systems and the pertinent in this case in an attempt to determine what if anything out of the ordinary is happening. And as we mentioned previously we do expect to get some television from the command module. Ken Mattingly advised us that he would be getting the camera unstowed and in operation as soon as possible.

SC Okay, Don they're on their way into the LM now and Charlie's in there John is joining him and I'll work on getting the TV camera out.

END OF TAPE

SC Okay, Don, they're on their way into the LM now and Charlie's in there and John's joining him and I'll work on getting the T.V. camera out.

CAPCOM Okay.

SC Okay, Houston, we're going onto LM power right now.

CAPCOM Roger.

SC Okay, we've gone to reset and off.

CAPCOM Roger, 16.

SC The time was 8:36 34.

CAPCOM Roger.

CAPCOM Ken, when you get the camera set up ready to operate we'll go to medium B width on the high gain antenna.

SC Okay, and it's going to be a few minutes.

CAPCOM Rog. I understand.

SC Okay, Houston, you should have the data now, according to our check list.

CAPCOM Roger.

SC We're down through step 7 on page 23.

CAPCOM Roger.

PAO We have the data from the lunar module, now we're looking at it. And we'll get an evaluation.

SC RCS, Quad A and B meter, take a look at them.

CAPCOM Stand by one.

CAPCOM 16, I guess we don't need the heaters. We're looking at all the data now.

SC Okay, we didn't say heater we said meter.

CAPCOM Roger, stand by.

SC I guess we can take your word for it, that's for sure.

CAPCOM We're looking at all the data now.

SC Okay, fine. Our systems A RCS meter, which is not powered, is at 92%, quantity and B is a little over 100.

CAPCOM Roger.

SC Okay, I'm ready to give you a T.V. from the outside.

CAPCOM Roger, Ken, understand.

PAO Our LM systems engineers report from the data we've seen so far that everything looks good. Looks normal, no evidence of any propellant leaks or pressurization leaks and we're standing by now for television from the command module.

CAPCOM 16, based on what we're looking at, the systems main pressures look okay. We don't see any problems with the tanks.

SC Okay, that sure is something strange going on, I never saw anything like that on LM 4. I mean I'm not normally a rabblrouser, it, it's just ain't something funny going on there.

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SC Would you like to have the wide beam
outside?

CAPCOM Yes, Ken, I guess so, we haven't got a
picture yet here.

SC Don, I'm waiting for you, you said some-
thing about some high gain things you wanted to do and I hadn't
done any of those things yet.

CAPCOM Oh, we wanted to go to medium beam width
on the high gain and we're ready for the pictures any time.

END OF TAPE

CAPCOM -- medium B width on high gain and we are ready for the take pictures any time.

SC If, it looks okay to you, Houston, do you want us to fire this thing down now?

CAPCOM Standby just a minute. We are going to one last long look here, but everything looks okay so far.

SC That's great.

CAPCOM 16, on panel 16 in the LM under the PUGS display breader and let's push that one in and we'll take a look at quantitties.

SC Okay, Don and do you have a picture now and I'm not going to zoom in until you've got a got a good picture.

CAPCOM Okay. that ones in and the quantities went to 100 each.

CAPCOM Looks like the TV's in standby, Ken.

SC Doesn't that help.

SC Rog.

PAO And we are getting a black and white picture.

CAPCOM Quantyffies lood good 16.

SC That's affirmed, they are both 100.

CAPCOM Okay, 16, we are ready to back out.

SC You pull that breaker right down. We'll have you pull the breaker first and back down// Thank you.

SC Okay, Don, can see any picture yet?

PAO At the present time we are looking at the picture in black and white waiting for the color converter to lock up.

SC Okay, I'm in transmit. Got a good monitor this time. I got FM transmitter. I got the S-band (garbled) the TV.

CAPCO Okay, Ken, I think the TV's okay. I think the problem is here. It will take us about another minute, I guess.

SC Okay, I'll stand by. I'll have to show you the part we're looking at.

CAPCOM Roger.

CAPCOM Okay, Ken, now we are getting a picture.

SC Okay, can you see the docking target and do you have a grid, I've got a gridth on my monitor which you should be able to correlate with. Do you have that available, if you don't I'll just try to talk you in towards the frame?

CAPCOM Standby just a minute. Sorry, Ken, I guess we don't have a gridth right now.

SC Okay, right now the center of my picture in just about from the center of the docking target, does

62/2

SC look like your picture?
CAPCOM Affirmative.
SC Okay, I'm going to move the camera up and there is a flat surface which is now just about in the center of my picture and it is pointing away from me, this is the one we can see it peeling off of.
CAPCOM Roger.
SC I'm going to try to zoom in on it then. I'll see the best monitor picture I can get and I may have to talk me on some of the other.
CAPCOM Okay.
SC Houston, our activation check list says leave the cabin repress breaker closed but we found it open. How do you want to play that one?
CAPCOM Standby me a minute. Want that one open all the way out.
SC Open, all the way out. Kgg.
CAPCOM That's real good, Ken. Hold it right there.
SC I can't hang them ---. I'm stuck here I'll get back with you.
CAPCOM Okay. You had a real good picture there where you were.
SC Okay.
CAPCOM Yeah, Ken, we are seeing the stuff coming off of there now.
CAPCOM Ken, while we are looking at it, we are trying to get a hack on whether or not there are any jets firing across that surface that would correlate with those particles coming off.
SC Yes, sir, there are. My A thruster seems to bang on it quite a bit. And we put the LM power back to CSM at 8 52, I'd say about 15 seconds ago.
CAPCOM Roger, copy.
SC Don, are you through with those pictures or do you need something else?
CAPCOM Hang on just a minute, Ken.
CAPCOM Ken, we see occasional particles come off, but we are not seeing a stream. Do you see a streaming like John was talking about earlier?
SC No sir. Ah, well, we are in an entirely different sun angle now and it is not clear to me. We don't see different things. Maybe John can take this thing and show you where it was coming from. I didn't see it.
CAPCOM Roger.
SC I'd be glad. I'd be only to happy to point it out.
CAPCOM Rog.

END OF TAPE

(garble and heavy noise)
SC (No it stopped, when we maneuvered it wou of
fhe sun it stopped pealing off.)
SC Yes.
SC Okay, Pete, take that back, you can see
a little of it as the particles stream off when they get out
into the sun you can see them. And it looked like they had
the same trajectory as the other ones, but it is very few
right now.
CAPCOM Roger. Kind of going out the top center
slight right side of the picture?
SC Yes, that's right, yes.
CAPCOM Rog.
SC Okay, I was off com over there, how about
bringing the old LRC up to speed.
CAPCOM Ken, can we roll to get this area back
into the sunlight where we could have a better look at it?
SC Okay, Pete, we're just about ready to
maneuver. We are maneuvering.
CAPCOM Okay, guess you want to go back the way you
came then go back to that attitude where you had good sun-
light on it.
SC Okay, that's the P-23 attitude.
CAPCOM Roger.
SC Okay, and every so often I see a particle
come out from that region, at some accelerated velocity, like
it is leaving the spacecraft.
CAPCOM Roger.
SC I can't speak for amu edification for all
all the pads the blanket pressure and the helium tanks looking
okay on the RCS?
CAPCOM Affirmative, they were, John.
PAO This is Apollo Control, the picture we're
getting right now is the interior of the command module. All
three crewmen back in the command module, now. And after the
look we got at the lunar module, on the telimetry data, every-
thing appeared to be normal. We've had a group of very interest-
ed engineers and projects management people here in the control
center, looking at the television picture. And can see very
clearly the panel which had the shreaded appearance what
Charlie Duke described earlier as appearing like shreaded wheat.
CAPCOM The LM we didn't show any current drain
when you went in there.
SC Yes sir, just like the refrigerator, it
came on, with the hatch about a quarter of the way open and
when I went to all we had all the flood lights.
CAPCOM Roger.
SC But you can see a lot better over there
when you take your shades off.

CAPCOM Rog

SC And Pete, every time the, one of the command module, service module, RCS plus X jets fire towards that one over the hatch it really blows that stuff off.

CAPCOM Roger, copy.

SC Okay, Houston, as of this moment that area is completely free of particles. It wouldn't do you any good to show you any T.V. of it, because it's not doing anything.

CAPCOM Roger, copy. Okay, John, I guess that's about all the data we're going to get, we're going to have to think that over for awhile, so go ahead and stow the T.V. camera and get back to the flight plan.

SC Yes, sir. It's certainly an unusual thing and further more it's very strange how this upper surface here has flaked off behind the docking target. Which I guess you can't see that on the T.V., I couldn't see it on the monitor. Can you see it on the T.V.?

CAPCOM We get a pretty good look at a portion of it, looks like a lot of, like Clarle

SC

an inch of grass growing out of the surface there.

CAPCOM Yes, we got a pretty good look at that.

SC Okay.

CAPCOM I don't think we know what it means yet, but we did get a good look at it.

SC Rog, Charlie, might say that looks bad.

SC Did you have a T.V. picture in the cockpit there.?

CAPCOM Affiramtigi, a real bried miniuue.

SC That's what I was afraid of.

CAPCOM Okay, 16, we'd like to get the waste stowage vent valve open again now.

END OF TAPE

CAPCOM Okay, 16 we'd like to get the waste stowage valve open again, now.

SC And, Pete the Lunar Module looks very clean there was very few particles in it and that's just about it over.

CAPCOM Rog, understand. And Charlie we'd like to go into the flight plan here at 12:15 and delete closing the waste stowage vent valve and move that to 13:15.

SC Okay, we're moving it to 13:15.

CAPCOM Roger.

PAO This is Apollo control at 9 hours 8 minutes. Again, to recap the situation after having the crew get in, power up the lunar module and taking a look at the external area where the material on the skin was shredding particles were coming out. We can find nothing obviously wrong and that's obviously reassuring to have all the data on the propellant tanks and the pressures, quantities looking normal. At the present time the thing that we're looking into is the possibility of an unusually large number of jet firings at some point from the command module reaction control system thrusters that might have perhaps degraded or burned the surface or chemically caused it to peel up the way it appeared to be in the television picture. But, I would say at this point that there is somewhat of a relaxed or at least not overly tense mood in the control center and certainly it was reassuring to see all the data looking good when we did power up the lunar module. Apollo 16 at the present time is 44 921 nautical miles from earth and the spacecraft velocity 8 851 feet per second. And, Charlie Duke reported also that the Lunar Module looked extremely clean when they got inside no particles floating around there have been times in the past where the lunar module has had particles on one occasion from some docking tunnel insulation that had gotten in there and also have been occasion where when the LM was depressurized glass covers on some of the instruments had broken. But, apparently no problems of that nature as Duke reported the LM looked very clean.

PAO At the point the crew will pick up their flight plan. They will be about 1 hour perhaps a little bit more behind where they would have been had this problem not cropped up. This is however a relatively slack period in the flight plan. We were expecting to be able to make up the time without a great deal of difficulty. They're scheduled to be taking some navigation sightings through the command module optics system. These will be used to update the onboard guidance systems knowledge of its position and trajectory.

PAO This is Apollo control as a point of interest that entire exercise in the lunar module took about 1 hour. We reached the conclusion here in the control center

PAO that we were going to ask the crew to enter the LM at about 8 hours 13 minutes ground elapse time. A couple of minutes after that John Young came up with a further report of what appeared to be particles venting from the LM which we enforced and further confirmed the decision to go into the Lunar Module. The crew Young and Duke to our best estimate were in the LM by 8 hours 30 minutes ground elapse time and spent about 16 minutes in the Lunar Module, during which time we got a good long look at all of the critical systems and could find nothing out of the ordinary. And I again repeat Charlie Duke's description the LM looked extremely clean and that does - evaluation would apply equally as well to what we saw on the ground and what the crew saw onboard.

CAPCOM Correction 1 and we're looking at about 12 feet per second on midcourse correction 2.

SC That's great.

PAO And capcom Don Peterson has just advised the crew that midcourse correction number 1 will not be required. That opportunity for the midcourse is scheduled at 11 hours 39 minutes and by the time we get around to the opportunity in midcourse correction number 2 the amount of velocity change it appears will be required some where on the order of 12 feet per second. By dropping midcourse correction 1, of course, that will give the crew a bit of help in making up the time that was lost in going into the Lunar Module and we would expect they would have most of that time made up by the time their ready to begin their rest period. Apollo 16 at this time is 45 817 nautical miles above the earth and traveling at a speed of 8 750 feet per second.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/16/72 GET 9:20 CST 21:15 MC-65/1

SC Don, do you anticipate any significant change
in the verb 49 maneuver angles due to our slip in time?
CAPCOM Negative, not at all, Ken.

END OF TAPE

PAO look at the telemetry data. And we know that everything looked fine -- all of the tank pressures were normal, the quantities were normal, and the temperatures were also normal. And we looked at the telemetry long enough to assure the LM systems engineers that we had had no leaks and that there were no leaks in progress, and there was nothing to indicate any problem whatsoever. Charlie Duke on coming out of the Lunar Module reported that everything inside looked very clean, and at about that time we also got the television picture from the Command Module camera which Ken Mattingly was operating and could see here in the Control Center a very clear picture of the few square feet of panels that were involved on the Lunar Module. These are aluminum skins about 4/1000 of an inch thick, and they are painted. And the description that Charlie Duke gave appeared to be very accurate. The TV picture we saw here in the Control Center indeed looked very much like shredded wheat. The surface had the paint curling up as if it had grass growing on it, or shreds of shredded wheat on the surface scattered around on what should have been a smooth relatively shiny surface. I'm seeing nothing to explain the problem. The last thought that was discussed here in the Control Center was the possibility that some affect from one of the reaction control systems thrusters on the Command Module had caused the surface to degrade -- possibly heat or chemical components, or something of that nature, and there appeared to be no problem associated with it. There has been no further discussion since that time, and there appears to be no further concern at the moment over what could have been a problem. The crew is presently involved in a series of star sitings, using the optical equipment, the sextant on the Command Module. Ken Mattingly is performing this exercise, taking sitings on a series of four stars, and then marking, pushing a button which enters the information into the Command Module guidance system.

CAPCOM Affirmative, still with you.

SC Okay. Hey, let me give you a couple of comments here real time so you can be writing them down. In one of the things that it mentioned was this business about reflections in the ---

END OF TAPE

SC And one of the things that they mentioned was this business about the reflections in the sextant when you do the 23's and I've got a gee it's a beautiful picture of the earth horizon the optics are just super and we've got a got a what lood like inverted sort of a bare image in the oposite side away -from the horizons. It's really quite obvious. And you can just see the bright areas.

CAPCOM Roger, that's in the sextant.

SC It's ab out Yes, it's in the sextant and it's about I don't know how to give you a percentage of the intensity but it is much less intense than than the thing in the earth. It's very bright. And the star is a - gee the match between the earth horizon as seen through a fixed line of site and the star line of site is just perfect. It's really nice. The only thing I can't see as well as I'd like like is the cross here and with the illumination turned up to full bright they just don't stand out when the old earth in the field of view. When I get them down against the earth itself then I can see the dark line but when I got it out in the sky beyond the earths horizon I just don't see it as well as I'd like.

CAPCOM Roger, copy.

SC And, as you probably noticed there we used that little adaptive short P23 erasable program which is really swift that thing just fires these things off and I don't feel like in any way we're having to take short cuts on the pointing accuracy. The only time it takes now is to dress up the substeller point on initial acquisition. That's what we're doing now that seems to take quite a while.

CAPCOM Roger.

PAO That was Ken Mattingly.

SC ... spacecraft and we should remember not to put the optics in the kitchen.

CAPCOM Roger, understand.

PAO That was Ken Mattingly giving a subjectiv evaluation of the optics and of the program used in computing these mid course navigations. Mattingly noted that there was a reflection in the CSM sextant the optical device that he was looking through in lining up a star in this case over the earth horizon. Once the star is lined up in the proper position Mattingly pushes a button and the computer automatically notes the time and the angle between the star and the earth horizon. And from this computes and updates its knowledge of the spacecraft position's trajectory. Mattingly noted that the - there did appear to be some somewhat of a reflection in the optics and he said it's primary affect was that it tended to wash out the cross hairs but that this was not particularly a problem. He said it was not as clean as he would like it, but we can verify it from the results that

PAO he's getting which we're watching here on the ground, but he is indeed having no problems, the flight activities officer who is watching the entries that are made into the computer said that the data that Mattingly is getting is better than was expected preflight.

SC That's the first mark isn't it?

SC I think he cycled on us.

SC I He's been taking a little bit longer each mark.

PAO This is Apollo control. Ken Mattingly is still involved in taking the midcourse sightings through the CSM sextant. On completing that activity the flight plan becomes relatively unencumbered. We don't have very many additional scheduled activities and we expect that the crew will be able to make up the hour that was lost in getting into the lunar module and checking - checking out what appeared to be a possible problem resulting from that the - one of the skins on the lunar module was peeling and the material flaking off and the possibility that something was underneath - one of the tanks or something connected with the LM thrusters and reaction control system was possibly venting and as we mentioned previously on getting into the Lunar Module checking things out everything appeared to be normal. The - one thing that we did notice when we had the television on the area of the LM which was affected one of the aluminum panels several square feet in area was that when one of the thrusters on the CSM was firing and in particular forward firing service module thruster that the material which had flaked off appeared to be disturbed and this would cause it to float off or to be propelled away from the Lunar Module. Flight Director Pete Frank feels that the most likely affect of the thruster is in disturbing the degraded surface and he feels that it is less likely that the thruster impinging on the surface itself actually caused the problem, although at this point any hypothesis as to what what caused the degradation of this thermal skin is purely speculative and we've seen nothing in the data to indicate any problem; however, the skin does appear abnormal and we have no explanation for it at this point. The midcourse correction maneuver which was in the flight plan the opportunity for that midcourse correction at 11 hours 39 minutes will not be required. The spacecraft is very close to the preplanned trajectory the flight dynamics officer reported that a maneuver of only about 8 feet per second would be required. This is so small that it will not be performed at this opportunity, but will be allowed to continue until the second midcourse correction opportunity at which time the amount of change in velocity that would be required would have grown to only about 12 feet per second. By deleting this midcourse correction that reduces the amount of things that

APOLLO 16 MISSION COMMENTARY 4/16/72 CST 21:57 GET 10:02 67/3

PAO the crew has to accomplish before their rest period which is scheduled to begin about 4 1/2 hours from now and makes it appear quite likely that they will be back on the normal flight plan by that time. At 100 or rather 10 hours 27 minutes this is Apollo Control Houston.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/16/72 GET 10:25 CST 22:20 MC-68/1

ALL DEAD AIR

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/16/72 GET 10:55 CST 22:50 MC-69/1

DEAD AIR TIME

END OF TAPE

CAPCOM 16, we've got a state vector update, if you will go to accept.
SC Roger, you've got full accept.
CAPCOM Roger.
CAPCOM And, ALSEP, you can copy. We've got a change to the GNC checklist, page 9-4.
SC Okay, I'm on page 9-4 now.
CAPCOM Roger and Baker, volume Baker, line 4, change from 11522 to 13353 and on line 5, change 13000 to 00041.
SC Okay, I am on page G9-4, column Bravo, line 04 is 13353 that replaces 11522. Line 05 00041 replacing 13000.
CAPCOM That's affirmative Ken.
SC Roger.
CAPCOM And 16, you can have the computer.
SC Okay, we are back to block.
CAPCOM Roger.
SC Don, you folks ready for a little fuel cell purge.
CAPCOM (garbled) we're ready.
SC Don, fuel - -fuel cell one purge, 02 purge is in progress.
CAPCOM Roger, copy.
CAPCOM 16, Houston, we're looking at an 02 flow of less than 1 pound per hour and we'd like to know if you have closed the waste storage vent valve.
SC Negative.
CAPCOM Roger, stay in negative.
SC Houston, you want us to dump the waste water down to about 10?
CAPCOM It's already 60.
SC Okay, 10 percent it will be.
CAPCOM Roger.
CAPCOM L6, let's terminate the charge on battery Bravo.
SC Okay, we're showing about 29 percent on our waste water now. How does that look with what you all have on the ground?
CAPCOM Well, we're looking at about 30.5 percent now.
SC Okay, so you want us to terminate ours at 10 percent, our gage reading at 10 percent will be good enough.
CAPCOM that's affirmative, 16.
SC Okay.
SC Okay, we've terminated the waste, dump
CAPCOM Roger.
SC Houston, we vented the battery and it went to .4, maybe .2 now.
CAPCOM Roger.

END OF TAPE

CAPCOM Charlee did you get a reading on that battery before you (garble).

SC Rog. point 9.

CAPCOM Charles was that .9.

SC Affirmative.

CAPCOM Roger.

PAO This is Apollo Control at 11 hours 59 minutes and its continued rather quiet here at Mission Control. We've had relatively few conversations with the crew aboard Apollo 16 in the last 45 or 50 minutes. The activities aboard the spacecraft have been primarily housekeeping sorts of things. Dumping the waste water. These tanks gradually fill up from excess water produced by the fuel cells and at a given level, they are dumped back down to about 10 percent of their capacity. The crew has aligned the guidance platform used as a reference for attitude. They'll be changing out the lithium hydroxide canister that -- one of the canisters that removes carbon dioxide from the spacecraft atmosphere. They also purged the fuel cells, running oxygen through the fuel cells at a high flow rate to remove any impurities and they are scheduled to be taking another series of ultra violet photographs of earth prior to beginning their rest period. They will also set the spacecraft up in the so called passive thermal control mode where the entire vehicle is rotated about its longitudinal axis at the rate of about 3 revolutions per hour to maintain the proper temperature equilibrium. And they are scheduled to begin their sleep period in about 3 hours. At the present time, Apollo 16 is 58,133 nautical miles from earth and traveling at a speed of 7,604 feet per second.

CAPCOM 16 could you give us a reading on LM-CM delta P?

SC Rog. LM cm delta P is 2 tenths, which is what it was in the altitude chamber and that apparently is 0 on our gauge.

CAPCOM Roger. Understand.

SC And the pressure equalization valve is verified closed.

CAPCOM Roger. 16 Houston on this UV photography, we want to be sure we go mode 3. I think last time, we didn't get that.

SC No, we did get it last time. (garble) on the last sequence we did go 3.

CAPCOM Say again.

SC On that first EV sequence, we did go 3.

CAPCOM Roger.

END OF TAPE

CAPCOM 16, go on redelta.
SPEAKER (garbled)
CAPCOM 16, when you finish the UV photos we'd like you to go on and start the PTC right away if you concur with it.
SPEAKER Be glad to.
CAPCOM Rog. and in connection with that we'll ask you to stow the high gain power to going into PTC.
SPEAKER Okay. We'll stow it.
CAPCOM Roger.
SPEAKER Hey, Don you really can get some pretty stable initial conditions.
CAPCOM Good deal.
SPEAKER Say, Houston. Casper.
CAPCOM Go ahead, Casper.
SPEAKER It looks huh - - it looks to me like we've used lot more RCS propellant than I would have guessed. Is it just our onboard readings or is that a fact?
CAPCOM We're seeing apparently some biases in the RCS sensors Stand by we'll get you some readings.
SPEAKER Okay. Thank you.

END OF TAPE

CAPCOM On the alpa 60.
SC On the alpa.
CAPCOM 16, prior to entering PTC go manual and
wide on the high gain and minus 52 and 270.
SC Okay, okay got manual and wide, minus 52
and 270.
CAPCOM Roger, thank you.
CAPCOM 16 Houston, we are going to have to delay
going into the PTC until after we close the waste stowage
vent valve at 13:50.
SC Okay, we're suppose to wait 20 minutes for
the rates to damp anyhow huh?
CAPCOM Sounds right. Okay, and on the RCS quantities,
I've got some numbers for you here.
SC Go ahead.
CAPCOM Roger. The quad A is reading 1.5 low, all
the rest of them are reading high. Quad Bravo is .6, Charlie
is 5.7 and Delta is 5.6 and our Delta on the flight plan is
a plus 5 total right now.
SC Okay, is that -- is that pounds, or percent
or degrees or what? Over.
CAPCOM The total of 5 pounds is pounds.
SC Okay. Thank you.
CAPCOM Roger. 16 Houston, we are starting to see
a high temperature in the subsatellite battery in the SIM Bay,
so what we'd like to do is go ahead and close the waste stowage
vent valve now and get into PTC as soon as we can.
SC Roger, waste stowage vent going closed
now. Houston, how do the rates look to you if we're going into
PTC now?
CAPCOM Standby a little and we'll take a look.
The rates look good and you can go ahead into PTC.
SC Rog.
PAO This is Apollo Control at 13 hours. Apollo
16 will shortly be going into its passive thermal control mode
with the spacecraft rotating at about the rate of 3 revolutions
per hour to maintain proper temperatures and we do have from
the flight dynamics officer now a preliminary estimate on the
time and location that the Saturn 3rd stage, the S4B will im-
pact the Moon. This event is tentatively now expected to
occur at 75 hours 6 minutes 28 seconds. And the preliminary
target point -- we expect that this will change somewhat as
we get additional tracking on the Saturn stage -- is latitude
1 degree 12 minutes north, 22 degrees 38 minutes west. This
is about 7 and a half degrees off of the planned target point,
30 degrees west was the nominal impact point for of S-IVB S4B but
as I said, we expect that these coordinates will be updated

PAO as we get additional tracking on the vehicle. We're now essentially back on the flight plan and having made up the approximately one hour that was lost in going into the lunar module earlier to check the lunar module after it was noted that paint was flecking from one of the thermal control panels -- one of the aluminum skins on the lunar module and we essentially now made up that time with the crew back on the regular flight plan.

SPEAKER See here. In monitor, the primary loop ran out temps and let it stabilize and then it may be necessary to go down to panel 382 and adjust it again to try to keep that temperature at about 45 degrees fahrenheit.

SC Okay.

CAPCOM And Ken if we have to do that, we'd suggest that you mark a place down there so that during the subsequent PTC's you can just set the thing to that mark.

END OF TAPE

CAPCOM 16, Go OMNI Bravo and we'll take over switching it for you.

SC You've got OMNI Bravo.

CAPCOM Roger. Thank you.

SC Hey, Don.

CAPCOM Go.

CAPCOM Go ahead.

SC You would really love this sight. As we rotate around, now, we've got the Earth out the window number 1, and it's about - oh, almost - not quite down to half, and you can see India and the continent. It's covered with clouds and no photograph can ever describe the way it looks. It's really super.

CAPCOM It really sounds fantastic. Wish I were there.

SC Yes sir. You would love it. You can see all of Australia, too. It's really something else.

CAPCOM About what size does the Earth look from where you are.

SC Looks like it's about -- it's approximately 4,000 miles in radius.

CAPCOM Hey, that's a pretty good estimate.

SC No, It didn't quite fill the window. I'm about well my eyes are about 3 feet from the window, and it didn't quite fill it.

CAPCOM Rog.

SC You know, a sight like that goes a long ways to make tomato soup taste good.

CAPCOM Yeah, that's what I've heard.

SC Don, I hate to belabor the point, but I would appreciate if the guys that are working on the RCS budgeting and all could take a look and see if they could determine if there was any place where we were going over more than what they might have expected from that phase.

CAPCOM Okay, we'll have them take a look.

CAPCOM Okay, Ken, for your info, they said you were slightly ahead following LM extraction and apparently we used a little excess during the P23s.

SC Okay. That stands to reason. But not being able to see the reticle on there is a real nuisance. You can do it. I guess there is also a certain amount of getting used to the nack of flying that thing around. For some reason, it seems a little bit different to find the attitude than it was in the simulator; but the biggest nuisance was the inability to see the reticle, but if that's where we used our extra, that's gine

CAPCOM Okay.

CAPCOM And 16, I've got P37 block data for about 4 different times for you when you're ready to copy.

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SC
CAPCOM

Okay, we'll get it in a few minutes
Reg.

END OF TAPE

APOLLO 16 MISSION COMMENTARY, 4-17-72, CST 01:23, GET 13:29 75/1

CAPCOM 16, Houston, we're standing by on this
237 block data pad anytime you're ready.

END OF TAPE

PAO This is Apollo Control at 14 hours and we're in the process of a shift handover here in Mission Control. Flight Director Jerry Griffin and his team of flight controllers coming on now to relieve Pete Frank team. And we do expect to have a change of shifts press briefing. That will begin in about 15 minutes and will be held in the MSC News Center Briefing room. Apollo 16 at the present time is 66 450 nautical miles from earth and the spacecraft velocity is 6990 feet per second.

SC Hello, Don you still there?

CAPCOM Hello, 16. Houston.

SC Huh, it's a new face.

CAPCOM Roger, we just changed over down here. How's things going.

SC Hah, this is really a ball Henry. The - - as much as I hate to say it this PTC doesn't look so red hot to us. Could you give us any clues whether it's going to hack it or not.

CAPCOM Okay. Stand by.

CAPCOM 16, Houston. We don't see anything down here that's causing it to diverge, but it does look marginal. We're going to keep an eye on it.

SC Okay.

SC Houston, Apollo 16. Over.

CAPCOM Apollo 16, Houston. Go ahead.

CAPCOM Apollo 16, Houston. Go ahead.

SC 16. Over.

CAPCOM Apollo 16, Houston. Go ahead.

SC Roger. We just cycled the H2 fans as per pre-sleep checklist. And fan number 3 was still in auto. Do you want to leave it in auto tonight? Over.

CAPCOM That is affirmative. Leave it in auto.

SC Okay.

END OF TAPE

CAPCOM Apollo 16 Houston, the block data -- P37
block data for the updates book whenever you're ready.

SC Oh yeah, wait one. Okay Hank go ahead.

CAPCOM Okay, that's 4 -- 4 blocks. I'll just
read them in succession. 02500 49 er 07, minus 165 07045
03500 7454 minus 165 07013 04500 5857 minus 165 09 er 431
05500 4879 er minus 165 11841 and these all assume no midcourse
2.

SC Roger, 02500 4907 minus 165 07045 03500
7454 minus 165 07013 04500 5857 minus 165 09431 05500 4879 er
minus 165 11845.

CAPCOM Rog. That last number was 11841.

SC Okay, 11841.

CAPCOM Apollo 16 Houston, we want to still keep
working on this SPS guaging problem. We'd like to get a read-
out if we could on your SPS fuel and oxidizer pressures.

SC Okay, standby. Okay, that fuel pressure
is reading right now 168, oxidizer pressure is in the green
and it's reading 186 or 87.

CAPCOM Roger understand, 168 and 186.

SC That's affirm isn't it and we were told
this morning before launch that that was nominal.

CAPCOM Roger.

SC We got because of bias in guage -- so we're
probably going to need some kind of -- another delta P figure
to go on our LOI card -- our midcourse card.

CAPCOM That's affirmative and it's in work.

SC Yes sir. And I think we show we have
just at 15 percent waste water, but we are going to go ahead
and chlorinate unless you think the ECOM's don't want that.

CAPCOM Standby Ken. 16 Houston we're not sure
we understand your question here. If you're asking if it's
okay to chlorinate the portable, that's good.

SC Okay, just wanted to make sure if you ever
need a water boiler, people don't like to put the chlorine in
there, so I just thought I'd check with you before I did
it.

CAPCOM Okay, I copy now. They say still press
ahead Ken.

END OF TAPE

SC Okay, Houston, we'll run the cabin pressure up to 57 as per this presleep checklist.

CAPCOM Roger. Copy.

CAPCOM 16, Houston. When you changed the lithium hydroxide canister, we noted a small drop in the suit and pressure Delta P down here. Did you change any of the configuration in the suit loop at the time you did that?

SC Well, Henry, some time back there during the day, I opened up the flow line to my hoses that had been turned off, then laid around to try and get some better ventilation in here. But I don't remember whether that was about the same time or not.

CAPCOM Okay. We're not concerned, we're just trying to answer the question. That's probably what it was.

PAO This is Apollo Control. The change of shift press briefing momentarily to begin in the small briefing room in the News Center; any air-to-ground conversation from Apollo 16 will be recorded for playback at the conclusion of the Press Conference. At 14 hours 32 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control. During the - just completed press conference some minute and half of tape from the air-ground from Apollo 16 was accumulated. We'll play back that tape at this time and rejoin any subsequent conversation prior to the time the crew goes into their 8 hour rest period. At 14 hours 43 minutes playing back tape and going live this is Apollo Control.

SC Thank you folks, you ready for a VERB 74.
CAPCOM Stand by.
CAPCOM Okay. We're ready Ken.
MATTINGLY How's that?
CAPCOM Apollo 16, Houston. We're showing you're
traverse vector up around 59. Recheck your O2 flow.
SC All right. It's off.

SC Houston, 16. Over.
CAPCOM Go ahead.
SC Roger. We've turned the voice off as
per the pre-sleep checklist.

CAPCOM (garbled) Will you stand by just a
minute 16.
CAPCOM 16, Houston. Do you have your O2 heaters
configured.

SC That's affirm. 1 & 2 is off, 3 is in auto
and the H2 heaters are both in auto.

CAPCOM Roger.
CAPCOM Apollo 16, Houston. This is frr Ken, do you have
anything to report on your film status?

SC That's in work Henry.
CAPCOM Okay.
SC Gee, Henry, I'm 16mm magazine. Alpha, alpha.
We have approximately 20 percent remaining.

CAPCOM Copy.
SC Non magazine November, November. That's a 70mm.
We're up to frame 33.

CAPCOM Okay.
SC And on oscar, oscar, it's frame 18.
CAPCOM Roger, 18.

SC And Henry, we are going without (garbled)
and what do you think about PTC.

CAPCOM Roger. The first part of your transmission
was blocked out. We had a antenna swtich. However, on the PTC,
(garble) thinks it will go throughout the sleep period and then
we'll reinitialize after you wake up. He don't think it'll go
a full 16 hours but it's good for the sleep period.

SC Okay. The first thing you said we'd go
without the tone booster. We'll go normal comm, okay.

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CAPCOM	Okay.
SC	That's for caution and warning.
CAPCOM	And Ken, did you use anything out of mag
Juliett, Juliett.	
SC	That's negative.
CAPCOM	Roger.

END OF TAPE

SC Okay Henry, are there any onboard readouts that you folks would like to have?

CAPCOM Negative Ken, I think we're all in good shape here, everything looks good at this point. You got anything else for us?

SC No, I just looked at my hand, I've got 5 and a half minutes to go to sleep.

CAPCOM Rog. Why don'r you take that. Y'all did a real good days work. Only 2 things left to do is those 2 COMM switches, the squelch and the normal mode voice. Get a good nights sleep and we'll see you tomorrow.

SC Yes sir, this is -- this doesn't come in the work category.

PAO And the communications officer here in Mission Control is reported that the crew has indeed turned off the voice switch onboard the spacecraft -- are settling in for a nights sleep. The spacecraft analysis status report dated at 14 hours ground elapsed time, less than an hour ago. Most of the entries state no change or performance is normal. For example, in propellant usage in the CSM reaction control system propellants, they are now 349 pounds over the predicted budget for this time in the flight. Fuel cells are working normally. All the cryogenic tankage in are normal condition. The S-band high gain antenna was stowed at 12 hours 48 minutes prior to the time they set up the rotisserie or passive thermal control barbecue mode in which they spin at about 3 revolutions per hour to stabilize the thermal response of the spacecraft. Although their quantities of hydrogen and oxygen are well within predicted limits, batteries are all up operating normally, with the required amp hours loaded. About a half hour ago, there was a brief discussion of a change -- a slight change or drop noted in the suit compressor delta P or differential pressure when they changed the lithium hydroxide canister. These lithium hydroxide canisters scrub the carbon dioxide from the cabin atmosphere. There was no concern voiced however, by the flight control team and it was merely a matter of curiosity. Apollo 16 now 70,213 nautical miles out from Earth, velocity 6,744 feet per second, crew is signed off for the night and unless some reason arises to talk either back to Mission Control or for the flight control team to contact the crew, we shouldn't hear from them for the next 8 hours. At 14 hours 58 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control, 16 hours and 1 minute ground elapsed time. The crew of Apollo 16 having some 6 hours 58 minutes remaining in their programmed sleep period. About 20 minutes ago, the Flight Surgeon reported that from his biomedical telemetry none of the crew was asleep at that time and that apparently Mattingly, because of a somewhat higher heart rate, was probably doing some exercising. For those persons who are interested in numbers and statistics, the half-way point in distance for Apollo 16, that is from surface to surface, Earth-Moon, will take place at a ground elapsed time of 25 hours 20 minutes, when the distance to both bodies, Earth and the Moon, will be 104,676 miles. The half-way point in time between lift-off and lunar orbit insertion will be at 37 hours 14 minutes and 18 seconds, at which time the Spacecraft will be 135,502 miles from Earth and 78,778 miles from the Moon. The so-called sphere crossing, where the Spacecraft leaves the Earth's influence and enters into the Moon's gravitational influence - this is an arbitrary point in space, actually, where the displays here in the Control Center become Moon referenced - will take place at 59 hours 13 minutes 26 seconds, and the distance from the Earth will be 178,646 miles; from the Moon, 33,820. Midcourse correction burn number 1 was not done, and the present predicted change of velocity for Midcourse 2, should the option be exercised for a maneuver at this time, would be 12.7 feet per second, a 2 second burn with the SPS. This would be at 30 hours 39 minutes; however, no decision on Midcourse 2 has been made and probably won't be for many hours to come. Apollo 16 presently is 74,420 nautical miles out from Earth, continuing to decelerate. Velocity now is 6,487 feet per second. And at 16 hours 4 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

APOLLO 16, MISSION COMMENTARY, 4-17-72, CST 4:55 A.M., GET 17:01 82/1

PAO This is Apollo Control at 17 hours one minute ground elapsed time, slightly under 6 hours remaining now in the Apollo 16 crew rest period. The spacecraft is now 77,898 nautical miles out from Earth, velocity now 6,288 feet per second. In in a continuing refinement of the predicted S-IVB impact statistics, we We have yet another set of numbers, the lastest predicted impact for the S-IVB stage on the lunar surface is at .93 north latitude by 22.35 west longitude at a ground elapsed time of 75 hours 6 minutes 22 seconds. These figures likely will be updated as more tracking is obtained and processed on the S-IVB. Apollo 16 continuing passive thermal control mode, PTC barbeque roll. No further communications from the crew of Apollo 16 since they signed off sometime ago, and at 17 hours 3 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control, 19 hours and one minute ground elapsed time into the mission of Apollo 16. Apollo 16 presently 84,895 nautical miles out from Earth. Velocity 5,920 feet per second, continuing to decelerate. While it may be a little premature the spaceflight meteorology group here in mission control is already forecasting that the splashdown weather conditions some 12 days away here are going to be good. Possibly a few rain showers in the area near Christmas Island, some 4 hours remaining in the crews sleep period. Spacecraft still in the passive thermal control mode, and will be in that Bar-B-Que role for a total of about 16 hours. At 19 hours 2 minutes, ground elapsed time, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control, 20 hours
1 minute ground elapse time in the mission of Apollo 16.
Some 3 hours remaining in the scheduled sleep period for
the crew. Spacecraft now some 88 262 nautical miles
distant from earth. Velocity now 5755 feet per second.
The numbers for the predicted S-IVB impact continue to
vary as the tracking is further refined. The latest numbers
from the Flight Dynamics Officer give an estimate of
impact at 2 degrees 16 minutes north latitude by 23 degrees
11 minutes west longitude, with an impact time of 75 hours
7 minutes and 4 seconds ground elapsed time. And this will
likely change several more times before the actual impact.
At 20 hours 2 minutes ground elapsed time this is Apollo
Control.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/17/72 CST: 2:55 GET: 22:01 86/1

PAO This is Apollo Control. 22 hours 1 minute ground elapsed time in the flight of Apollo 16. Here in Mission Control, the flight control team of Gene Kranz is being briefed for the next 8 hour shift, as Gerry Griffin's gold team plans to, makes preparations for retiring until tomorrow morning. There will not be a change of shift press briefing with the gold team flight director and as much as the entire shift with the exception of about the first 30 minutes have been, consisted of the crew being asleep. Distance at this time, Apollo 16 is 94,738 nautical miles out from earth approaching the moon at 5,458 feet per second. Total spacecraft weight 103,078 pounds. At 22 hours 2 minutes ground elapsed time, this is Apollo Control.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/17/72 CST 10:21A GET 22:28 87/1

PAO This is Apollo Control Houston at 22 hours and 28 minutes ground elapsed time. The handover in Mission Control between the 2 Flight Control teams has been completed. The team of Flight Controllers headed by Gene Kranz are all now onboard. Our CapCom for this shift will be astronaut Tony England. We presently show Apollo 16 at an altitude of 96 103 nautical miles from earth and traveling at a velocity of 5399 feet per second. Our clock in Mission Control shows that we're approximately 31 minutes away from time of crew wakeup. At 22 hours and 28 minutes continuing to monitor, this is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control Houston at 22 hours 57 minutes ground elapsed time. Our displays presently show Apollo 16 at a distance of 97,619 nautical miles away from the earth and traveling at a speed of 5,334 feet per second. We're about 2 minutes away now from scheduled time of crew wakeup. We'll leave the line up at this time as a means of picking up conversation as it transpires. We're at 22 hours 58 minutes ground elapsed time. This is Apollo Control Houston.

PAO This is Apollo Control Houston 23 hours and 3 minutes ground elapsed time. We're still standing by awaiting Tony England's call up to the crew of Apollo 16. We presently show Apollo 16 at a distance of 97,906 nautical miles away from the earth. Velocity now reading 5,322 feet per second.

PAO Standing by now awaiting Cap Comm Tony England's call to the crew of Apollo 16. This is Apollo Control Houston at 23 hours 4 minutes into the mission.

CC Apollo 16 Houston. Apollo 16 Houston.

SC Glad there Houston. How you doing?

CC Hey, you sound good. Good morning up there.

CC How are you doing?

SC Great.

CC Good all your systems look...

SC Good work.

CC Good show. Everything looks fine up there from down here.

SC Oh, yes. It sure beats work.

CC How are your comrades doing?

SC Oh, they are just starting to stir.

CC I'd hum something for you to wake you up but I've got a tin ear.

END OF TAPE

PAO Apollo Control, Houston, 23 hours 9 minutes ground elapse time. The Apollo 16 presently 98 222 nautical miles away from the earth. The velocity now is reading 5309 feet per second.

PAO This is Apollo Control, Houston, 23 hours and 16 minutes at ground elapsed time. Apollo 16 now 98 558 nautical miles away from the earth and traveling at a speed of 5295 feet per second. Very little conversation with Apollo 16 thus far, however, the wakeup call has been placed and we'll standby and continue to monitor. We're at 23 hours 16 minutes at ground elapsed time and this is Apollo Control, Houston.

SC Houston, 16, over.

CAPCOM Go ahead, Chuck.

SC The commander ate a sandwich and his orange juice and his PRD is 22028 and he had seven hours of sleep. Best ever in space flight. No medication .3 voids 34, 20, 18, fluid intake, total 21 ounces, over.

CAPCOM Okay, we got that, Charlie.

SC Okay. For Ken he had from VOC everything but the pecan and he ate a sandwich and his orange juice. His PRD is 15030. Six hours in the eight-hour period but was awake every once every hour. Okay. Excuse me.

CAPCOM Okay.

PAO We're switching OMNI's at this time. That is Charlie Duke with the post-sleep report.

SC (garble) and 13 ounces total intake.

CAPCOM Okay, Charlie, could you say the void again on Ken?

SC One was timed 41 seconds; the other one was (garble) due to a malfunction bag. And we got on me now for my meal. I had the sandwich and the orange juice that was in the soup. For meal C, I had ham and spaghetti, all the ambrosia and the cocoa. My PRD is 21040. I got about five hours sleep, and 2 voids of 20 and 25 with about a 20 ounce fluid intake, over.

CAPCOM Okay, I got it all. Sounds like you all slept pretty good.

SC Well, it was off and on for me. I must have been ...

CAPCOM I tell you, I'd be so excited, I wouldn't sleep at all.

END OF TAPE

CAPCOM Apollo 16, Houston.

CAPCOM I tell you --

CAPCOM I tell you I'd be so excited I wouldn't sleep at all.

PAO This is Apollo Control Houston. 23 hours 32 minutes ground elapsed time. Apollo 16 now 99,379 nautical miles away from the earth. Now traveling at a speed of 52 hundred 61 feet per second.

SC Houston, we charged your battery A. And on that food Tony, add my apricot cubes. I just ate them.

CAPCOM Okay, Charlie.

CAPCOM Charlie, Houston.

SC Go ahead.

CAPCOM Okay, on that fluid consumption there, the numbers you gave were in ounces. Could you verify that's ounces and not bags?

SC Say that again, Tony.

CAPCOM In the fluid you've consumed -- the drinks -- you gave the numbers in ounces, and I guess the blank here is listed in number of bags and partial bags, and they just want to verify the fact that the number you gave was in ounces, and also to check and see what unit you want to use for the rest of the mission on that, so everybody will have it straight.

SC Okay, we'll use -- we'd like to use ounces and that's what we'll go with.

CAPCOM Okay.

SC That's what I read.

CAPCOM Okay, I understand. Thank you.

SC The, the menu side of it, the things that are in the menu's are in -

CAPCOM Okay, we understand.

PAO This is Apollo Control Houston. 23 hours 42 minutes ground elapsed time. That was lunar module pilot Charlie Duke talking to CAPCOM Tony England here in Mission Control clarifying one point in the post-sleep report. We presently show Apollo 16 at a distance of 99,923 nautical miles from the earth, and traveling at a speed of 52 hundred 38 feet per second.

SC Okay, we can see the earth out there, and it's getting a good deal smaller. It's about the same size as the moon, almost out the other window. And Africa is clear this morning. At least the part that we can see which is what's easily clear right around from the Canaries on.

CAPCOM Very good. We've got you about a little over, well you just passed 100,000 miles on our chart here.

SC I would guess we're about a 100,000 miles

CAPCOM Well, sounds like a milestone. They say you're only 14 miles up, John, you're going to have to recalibrate your eyeball.

SC Okay, from our point of view, you only got a little more than half an earth.

CAPCOM Oh, that's right. We forgot you're kind of handicapped.

SC (Garbled)

PAO This is Apollo Control Houston. At 23 hours 51 minutes ground elapsed time. Apollo 16 now 100,355 nautical miles away from the earth, and now traveling at a speed of 52 hundred and 20 feet per second. It's been a very quiet day thus far for the crew of Apollo 16. We've heard from them with their post sleep report, and aside from a brief commentary by John Young on his view of the earth, we've heard little else at this point, but we'll stand by and continue to monitor. This is Apollo Control Houston at 23 hours 52 minutes ground elapsed time.

CAPCOM Ken, Houston.

SC Go ahead, Houston.

CAPCOM Okay, I've got a systems status report whenever your comfortable and would like to hear it. There's nothing to write down on that.

SC Okay, can we stand by awhile.

CAPCOM Sure, no hurry at all.

SC Thank you much.

CAPCOM Okay, just give me a call when you're ready.

SC Alrighty.

PAO This is Apollo Control Houston at 24 hours 5 minutes ground elapsed time. Apollo 16 now 101,035 nautical miles away from the earth. The velocity now reading 51 hundred 93 feet per second. During this period of relative calm and quiet, we'll pass along a brief update to our status on the crew report of last night of a, of particles emitting from the lunar module in the vicinity of the aluminum closeout panel which covers the MYLAR insulation over the RCA system number, system A. The panel in question is 50-56 aluminum .004 inches thick with a .001 coating of white silicone paint. The paint is applied and baked for one-half hour at 400° F. Grumman aircraft engineering has been checking the paperwork on the panel to see if its processing has been different than that before, making a thermal analysis to see if the mission could possibly be affected by the situation. The analysis shows the flaking will not affect the mission. Preparing a test plan to conduct on a simular panel that is being flown to Grumman from the Kennedy Space Center, tests would be expected to include such things as wiping the finish with different solvents and then to simulate flight vacuum and temperature conditions at an altitude chamber. The paint on

PAO this panel is applied to 8 panels on each side of the lunar module. The coating is applied to handle the thermal conditions on the moon in the event of a T plus 24 hour launch when the sun angle of the Moon would be higher. We're at 24 hours 7 minutes ground elapsed time. We'll continue to monitor for any conversations with the crew of Apollo 16. This is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control Houston at 24 hours 14 minutes ground elapsed time. Apollo 16 now 101,502 nautical miles away from the earth, and traveling at a speed of 51 hundred 73 feet per second. We presently show the spacecraft weight at 103,078 pounds. We'll stand by and continue to monitor any conversations that might take place between the crew of Apollo 16 and our CAPCOM in Mission Control, Tony England.

PAO Stand by to continue to monitor.

SC (Garbled)

CAPCOM Okay. That sounds good. On the systems status, the RCS, everything looks fine. Your 27 pounds ahead on your usage. Must have a very light hand on the throttle there. Okay, and on the ECS, okay, the failure mode most probably in the control electronics. The valve is driving at max rate that's 12 seconds full open to full close, and they saw that on the TM by the flow rate. I don't recommend making any sensor changes since that doesn't seem to be the problem, and thermal runs are being made here at this time to determine the settings for the lunar orbit. They don't anticipate any problems with it.

SC Okay. I kept watching it since we've set it. We haven't touched that thing now for a long time and maybe I just haven't caught any of the extremes, but it looks like it's been holding nicely between about 45 and 50.

CAPCOM Right. We concur. We don't think your going to have to touch it until you go to the dark side. - steering translunar coast to helium in the SPS oxydizer tanks is absorbed by the oxidizer causing a decrease in oxidizer tank pressure. Your transducer hasn't indicated this and there maybe a problem with that transducer. We've got a procedure change that I'll give to you later and your flight plan update prior to the midcourse 2 that allowed them to check that transducer.

SC Okay, Tony, and is there any changes in the midcourse 2 time or is it going to be like the flight plan.

CAPCOM Right now it looks as per flight plan. Okay, and on your DSE tape, Hank had a chance to take a look at it. Said it sounds fine. Dick will be in a little later and listen also, so everything looks go for the operations lunar orbit. And everything else looks great. Kink of nice not to have much to say here. Sure isn't like the sims.

SC Yea, I hope we've flown the last sim.

CAPCOM Right. I got a little -

SC Man, you just said it all.

CAPCOM That's right. I went through the news. I don't know whether you guys over you coffee would like to read the news paper, but I've got all the news that's fit to print, and I really don't have much to say. A great piece here is in the world of art. One of Vincent Van Gogh's best was stolen from a stand in the San Diego's art gallery as part of a display that

CAPCOM was named "out of sight", and I've got a input from Dottie here for Charlie.

SC Go ahead.

CAPCOM Okay, she said your five bird eggs have hatched so you've got 5 new healthy neighbors.

SC Oh great, thank you.

CAPCOM Your welcome. Okay, and on the flight plan update we have 5 items and there's no hurry to get them up there. When ever you're ready to take them and write the stuff down, I'll send them on up.

SC Okay, why don't you give us 10 minutes or so.

CAPCOM Okay, that'il be fine.

SC Tony, you'd enjoy seeing this place. After all the things you had to go through to keep the cockpit nice and clean out here, you'd never recognize it.

CAPCOM We'll, it probably looks like any any bachelors pad.

SC (Garbled)

PAO Apollo Control Houston. 24 hours 22 minutes ground elapsed time. Apollo 16 now 101,860 nautical miles away form the earth, and traveling at a speed of 51 hundred 59 feet per second.

SC What's the plan update?

CAPCOM Okay, stand by a second Charlie.

CAPCOM Charlie, Houston.

SC Okay.

CAPCOM On the flight plan update, you can dig out your CSM updates. We'll make a change to a couple of procedures in there.

SC The flight plan or the update book.

CAPCOM Okay, this will be in the update book, this first one.

SC Set.

CAPCOM Okay, go to the section on flight plan update. It has the EMP programs. Okay, we'd like you to add a last step to each of the four EMP probe procedures. So that would make a four step on the shortened P23 and seventh step on manual range input, etc.

SC Okay, stand by Tony. They must have a hand over. You were cut out. Start over again please.

CAPCOM Okay, understand. Alright, in the flight plan update section, on the 4 EMP program, we would like for you to add a fourth, correction, a final termination procedure to each of the four programs. So on the shortened P23 we would have a step four, which reads VERB 25 NOUN 26 enter, and then the four registers ater all balls, correction, three registers enter all balls.

SC Okay, copy. 4 step for P23 is VERB 25 NOUN 26 enter all balls in all registers.

CAPCOM Okay, and on the next program the manual range input step 7 would be the same thing.

SC Copy manual range input step 7 to VERB 25 NOUN 26 enter, all balls.

CAPCOM Okay, and on the optics angle to body angles, the later step 7 and it would be the same as before.

END OF TAPE

CAPCOM Okay, and on the jet monitor program, it'll be a step 6, the same thing. Okay, the purpose for these was to protect the E memory from other programs.

SC Okay.

CAPCOM Okay, the next change is to your SPS burn rules. So if you can get that card.

SC (garble)

CAPCOM Okay, on the fuel oxidizer pressure should read - or does read greater than 115, will you change it to read 124 for oxidizer, 110 for fuel.

SC Okay, pressure greater than 115 is changed to 124 oxidizer, 110 fuel.

CAPCOM That's correct. And in the fuel to oxidizer DELTA P it reads less than 20 psi. We'd like to change that to 35 psi, oxidizer greater than fuel or 5 psi oxidizer less than fuel.

SC Copy. 35 oxidizer greater than fuel, 5 oxidizer less than fuel.

CAPCOM Okay, and the final part of that is in the types constraints there in the box. It says greater than 160 and greater than 80. We'd like to change that to greater than 168 oxidizer and greater than 153 fuel.

SC (garble) oxidizer, 153 fuel.

CAPCOM And I guess on that types constraints also, it's the chamber pressure, it says greater than 80 for the type constraints. Okay, and that's the end of that procedure. A note here that this assumes a good oxidizer transducer. And there may be a problem that it's hung up. And we'll have a little later change in the midcourse 2 burn procedure. And from this we'll be able to tell what - where the problem is. I'll get that up to you as soon as they've sorted it out here. Okay, and there are 2 notes here. For Ken, a reminder to watch the UV film consumption magazine Oscar Oscar. He's right on the budget now and there's no pad.

SC Roger. And there's no way to cut a film out.

CAPCOM I understand.

SC Now, we're being tight Tony, if you see us slip behind, I guess I don't know what to do about it - you'll have to come up with a recommendation of what other photo to delete.

CAPCOM Okay, well we just thought we'd let you know that you had a 2 frame pad and we've already used it.

SC You mean we've taken 2 frames we weren't supposed to?

CAPCOM I don't understand the note here. That was the note I got. Maybe it was used up before they loaded it

CAPCOM or something. I'll find out.
SC As far as I know, Tony - yes, I just want to make sure that there's no misunderstanding on our part about what it is we're supposed to do because we took only those frames that were selected cause we are aware of the tight budget.

CAPCOM Okay, understand.
SC And we might be off a little bit on the numbers we gave you, cause you know that counter's kind of gross and it's easy to get off by a counter or so, particularly when you start at the low end.

CAPCOM Alright, understand. I missed more than a number. Okay, and a last note. We'd like you to take a look when you get a chance at the LM thermal surface, and see if you notice any changes or can give us any more words on it. We really don't anticipate a problem there, it turns out in looking back, there is a history of one batch of bad paint and they sort of think it is just the paint blistering up. And it doesn't seem to be -
SC Alright -
CAPCOM On the surface that'll give us a real bad problem.
SC Okay, we're ready to bring up the high gain if you've got some angles for us.
CAPCOM Okay, I'll get them. Okay, we'd like you to stand by for 10 minutes on that high gain.
SC Right.
PAO This is Apollo Control Houston at 24 hours 39 minutes ground elapsed time. Apollo 16 now 102 739 nautical miles away from the earth, and traveling at a velocity of 5123 feet per second.
CAPCOM Charlie, Houston.
SC Go ahead.
CAPCOM Okay, on the high gain, we'd like you to select PITCH minus 40, YAW plus 90 and the beam width in narrow, and we'll give you a cue to switch over to the high gain.
SC Okay, you've got them selected. You are going to cue us you say?
CAPCOM That's affirmative, we'll give you a cue.
SC Okay.
CAPCOM Charlie, Houston.
SC Go ahead.
CAPCOM Okay, we'd like you to go reacquisition now and we'll command.
SC Say again?

CAPCOM We'd like you to go reacquisition now.
SC Okay, you've got react and high gain.
CAPCOM Okay.
SC Okay, Houston, to discuss that thermal layer of brass that we've got throwing on the - throwing just outside the docking target. It's thinned out a pretty good bit since last night. I think it's gone somewhere, but there a lot of these little square - rectangular strips about up to 2 inches long, I see one that must be 3 inches long and they just sort of look like they're glued - somebody glued a bunch of strips of grass onto that thermal shield. Most of them are gone. Where there was 100 per cent coverage before, it looks like it's about 50 per cent coverage now.

CAPCOM Okay, we copy that.
PAO Apollo Control Houston, 24 hours 48 minutes ground elapsed time. That was John Young describing the current status of the particles on the lunar module. We show Apollo 16 at 103 197 nautical miles away from the earth traveling at a speed of 5106 feet per second.

SC Hey, Tony. Are you folks ready for us to press on with a little film cycle?
CAPCOM Stand by a second, Ken.
SC Okay.
CAPCOM Okay, Ken, Houston.
SC Go.
CAPCOM Okay, we'd like you to go ahead on the film cycling down to the MSFN cue, and then call us back.
SC Wilco.
SC Okay, Houston. How about a cue.
CAPCOM Okay, stand by a second.
CAPCOM Okay, Ken. Go on with your procedure.
SC Okay, I'll read these out as I go through them.

CAPCOM Alright.
SC And the only thing that looked a little different was when I got down to the step that said Pan Camera mode to standby. It already was. I guess that's just an oversight.

CAPCOM Okay. Okay, that's no problem.
SC (garble)
SC Okay, Tony. Can you read me now, I'm on VOX?
CAPCOM Yes, you sound fine.
SC Alrighty. Mapping camera is coming on. Stand by. Mark. Would you like to have the pan camera cell test simultaneously or would you like to do it sequentially?

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CAPCOM Okay, we'd like it simultaneously.

PAO You hear -

SC (garble) cell test, getting cell test.

Mark. Barber pole now.

PAO You can hear command module pilot Ken Mattingly checking out the pan camera and the mapping camera onboard with the Mission Control Center in Houston. This is Apollo Control Houston at 24 hours 55 minutes ground elapsed time.

END OF TAPE

PAO Apollo Control Houston at 24 hours 56 minutes ground elapsed time. Apollo 16 now 103,540 nautical miles away from earth.

SC Flag and the pan camera moon talk back and that took about 45 seconds as opposed to a minute.

CAPCOM Okay, we copied that.

SC Okay, so I'm going to go ahead and take the pan camera power off.

CAPCOM Okay.

SC Okay I'm getting ready to take the mapping camera to off center.

CAPCOM Okay, I've got two minutes here.

SC You've got a good watch.

CAPCOM Right. A Mickey special.

SC Okay there's our 30 seconds.

CAPCOM Okay.

SC Take the snack power off.

SC Man that's what you call a good touch.

SC Okay, Tony we're going to OMNI BRAVO and selecting is turned to high gain. L band AUX TD to OFF.

CAPCOM Okay, sounds good, Charlie.

SC Get Lee's junk back to PDT intercomm.

Thank you.

CAPCOM Okay, Tony we got the delta LM CM delta P of .8 and John's on the biomed now.

CAPCOM Okay, we copy that.

PAO Apollo Control Houston. 24 hours 58 minutes ground elapsed time. The crew of Apollo 16 following very closely the timeline in the flight plan. Apollo 16 Commander John Young has just donned a biomedical harness as reported by Lunar Module Pilot Charles Duke. At 24 hours 59 minutes Apollo 16 is 103,686 nautical miles away from the earth.

CAPCOM Hey, John you are giving us some great TV there.

SC What did you say - what did you say Tony?

CAPCOM I said we're getting some great TV down here. It looks good.

SC Was that one of your tapes?

CAPCOM Ah so, that's a tape, sorry about that.

PAO This is Apollo Control Houston at 25 hours 7 minutes ground elapsed time. That exchange between Tony England and Apollo 16 the reference was to a replay which had taken place in the Mission Control Center of the tape of yesterday evenings television. This picture is being studied by some of the flight controllers here who had not had an opportunity to see it before along with Dr. Robert R. Gilruth who was the former director of the Manned Spacecraft Center. We are at 25 hours 8 minutes ground elapsed time. Apollo 16

now 104,125 nautical miles away from the earth and traveling at a speed of 5,068 feet per second.

PAO This is Apollo Control Houston at 25 hours 11 minutes ground elapsed time. Very little conversation is taking place between our CapCom Tony England and the Mission Control Center and the crew of Apollo 16. It is during this time frame however that the crew of Apollo 16 should be performing the electrophoresis demonstration and during this demonstration the crew will attempt onboard to prove the higher purity of particle migrations in zero g. Three mylar tubes containing microspheres are used for this activity. The tubes are positively and negatively charged at either end. The movement of the microspheres is then studied. This movement is documented by means of the 70 millimeter Hasselblad camera. This is the demonstration that was also performed during Apollo 14. We're at 25 hours 12 minutes ground elapsed time. We're continuing to monitor. This is Apollo Control Houston.

SC Houston, 16.

CAPCOM Go ahead.

SC (garble) just about to pick up the power cable and turn the power on (garble) instructions from Houston.

CAPCOM Okay, instructions I have there are to press on through that hold and go on down to just before starting the camera and then hold again and give us a call.

SC Okay.

CAPCOM Apollo 16, Houston.

SC Say it over.

CAPCOM Okay, at your convenience when you get a chance we'd like to read out all quads so that RCS propellant quantity for correlation with a TM.

SC Okay, A is 90. B is 96. C is 96. D is over 100 (about 101 or 102).

CAPCOM Okay, we copy that.

SC Houston.

CAPCOM Go ahead Charley.

SC (garble) Clear down in the step tub before Ken turns on the electric freezes fire, where do you want us to hold that? Over.

CAPCOM Okay, we'd like you to hold just prior to starting a camera.

SC Okay, just prior to starting the camera.

CAPCOM Rog on the next page.

SC Okay, how about telling us where we're going here because I've got to turn this thing on and I'd like to have it in my mind what it is we're going to do.

CAPCOM Rog, it's no big deal. The note here was at that point you're supposed to observe the current meters but if there is no indication of a current flow on any tube

you tap the box gently along the axis, parallel with the face, and then you allow the whole unit to fly motionless for additional 3 to 5 minutes before proceeding. They're afraid there may be a bubble in one of the tubes and you don't get a current.

SC Well, okay. Actually there is a bubble in each tube.

CAPCOM Say that again.

SC Actually there is a bubble in each tube. And it's each tube has a bubble. They are in exactly the same place. They are lined up in a row, and they are directly over meter number 3. And the bubbles are about, oh, an eighth of an inch in diameter.

END OF TAPE

SC Okay, well actually, there is a bubble in each tube.

CAPCOM Say that again?

SC Actually, there's a bubble in each tube and it's -- each tube has a bubble, they are in actually the same place or lined up in a row and they are directly over meter number 3 and the bubbles are about 8 of an inch in diameter.

CAPCOM Okay, the PI's say that's okay and we should go ahead and proceed.

SC Okay, now, the question that you had for me was that if any of the meters do not go into the green you turn the power on. Did you want me to tap the box and then do what?

CAPCOM Okay. The instructions were to tap the box gently, allow the unit to remain motionless for additional 3 to 5 minutes and then proceed.

SC Okay. At this time if we don't get the meters into the green we proceed anyhow, is that correct?

CAPCOM According to the instructions, that's correct.

SC All righty.

PAO This is Apollo Control, Houston, 25 hours 27 minutes ground elapse time. That was Ken Mattingly Command Module Pilot, of Apollo 16 discussing procedures for the electrophoresis demonstration with Capcom Tony England here in Mission Control. We now show Apollo 16 at the 10,557 nautical miles away from the earth and traveling at a speed of 5032 feet per second.

SC Okay, Tony, it turns out that meter number 1 is just barely into the red, meter number 2 didn't come up quite into the red, meter number 3 is about a needle width below the red.

CAPCOM Okay. We'd like you to go on with the experiment.

SC Okay, I've jiggled this a little bit and -- let it settle here for a second and then we'll start and give you marking instructions.

CAPCOM Roger, we compare it.

SC Okay, Houston, we've started the experiment and as soon as we got it rotating -- got it running, and I turned the course to the decal on the box which is counter-clockwise F rotation, and as soon as I did, the orange film disappeared and I see white particles coming through the screen. It looks much like a -- it looks like kleenex.

CAPCOM Okay. We copied that. Any difference in rate between the different tubes?

SC Yeah. The first thing that happened as soon as I opened it, I got a big blob of this, so, (garble) it looks like the inside of the window here between the -- where it shows the decal (garble) sample 1 and 2. It's got a big -- couple of big blobs in there.

SC Number 1 sample is opening up. Number 3 sample is about halfway between 353. Also, have current meter number 1 is a degree, parameter 2 is a degree and number 3 is still about a needle width below the red line. It hasn't move at all. The bubbles are moving at about the same rate as the white material and the first bubble in number 2 is just reached the yellow band and as I understand this, I'm going to have to wait until the white material reaches that yellow band.

CAPCOM That's affirmative. The white material in the fastest tube.

SC Okay.

CAPCOM We had some bad comm right there in the middle when you were describing the rates and different in the three tubes of the white material. If you can say a little bit of that again, it might help.

SC Okay. It's moving much more rapidly than I had anticipated with Tony. Right now, the number 2 sample is leading by about a nose. It just crossed the one - two - three- four fifth ring described on that center tube. The number three sample has just crossed the fourth one, the number 1 sample had just crossed the fifth one now and number 2 is about halfway between 5 and 6. Number 3 sample is maintaining a very cohesive shape. It looks like a little cylinder with a pointed nose on it and it's maintaining its white consistency. And it's going, I would guess, at the rate of the group of particles in there that's maintaining a solid appearance is about the width of one of these lines. Then, it pales out to a very diffuse gaseous just a swirl material behind it that goes all the way back to the lexium. The master samples are diffusing much more rapidly and they have a little nose on them which is very thin and that leaves the head of the larger masses of material. They form sort of a cold shape and they are about two and a half to three ring lengths in length, and I'm talking about the distance between the sets of rings. And they both appear to be diffusing about the same amount. The number 2 sample is really starting to break up now and starting to twist the -- it looks like it's taking on a corking screw appearance as it approaches the yellow line, and now number 1 (garble) switch.

CAPCOM Okay. You say there is no difference in diffusion between 1 and 2.

SC Well, there wasn't when we started but now that we hit the reversal switch, I guess all bets are off.

SC The -- they've just really broken up in number 2 and then holding together a little better. They really looked very, very, similar, except that just as it cross the last ring before the yellow ring, number 2 started to get in the logging nose on the point and it would start to twist and I said it was looking like a cork screw and then about the same time when just about the time I hit the reversal switch, the sample in number 1 did the same thing. The sample in number 3 is doing an entirely different operation. It is taking sort of a bullet shape all the way down as far as it went and now that we reversed it, the pointed end which was on the right side, the direction of motion has now become a flat blunt end and it's picking up kind of an arrow shaped head on the left side as it goes back towards the container. But it's still retaining its cohesiveness. The sample number 2 just really got all diffused and spread around and number 1 holding together a little bit better. It's starting to take shape that looks very much like number 3 and pack D. The trailing edge, that's the one on the right side now, sample number 1, is just about caught up. It looks very much like sample number 3 except that you can tell that some of the material on sample 1 is a bit diffused.

CAPCOM Outstanding.

SC And we're about to approach the original end. Do you want me to reverse it again or what do you suggest at this point?

CAPCOM Yeah, Ken. We'd like you to reverse it again.

SC Okay, and I'll do that when the first large portion of the sample reaches the lex hand manifold, is that okay? That's -- some of the diffused material large on one side.

CAPCOM Okay, that's sounds good.

PAO Apollo Control, Houston, that is Ken Mattingly describing the movement inside the three tubes for the electrophoresis demonstration. We're at 25 hours 37 minutes into the mission. Apollo 16 now 105559 nautical miles out from the earth.

SC (garble) and I reversed it when the pointed end of sample number 3 reaches the first marked ring before reaching the left end manifold.

CAPCOM Okay.

SC And it's starting to snake now. These little blobs don't seem to take this reversal so well. Another thing that was a little different on that first -- after I reversed it, sample number 1. I mentioned all three had

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SC bubbles who were right together when
we started. The bubble on the (garbled) passed over to the extreme
right end except that number 1 when we reversed the samples, it
was revented in the right end, numbers 2 and 3 traveled with
the material.

CAPCOM Okay. Copied that.

END OF TAPE

SC Okay, Tony number 2 has reached the end again I'm going to reverse it for the last time.

CAPCOM Okay.

SC It's reversed at this time. Mark it.

CAPCOM Okay.

SC Number 2 is completely - looks like an emulsion. Number 1 still has a central core that is holding together and number 3 is doing a good job of staying together. It - the dew is very little.

CAPCOM GARBLE 2, copy that?

SC Okay, and at the end of this it looks to me like it's so diffused that at the end of this run and if I get it back I'll just go ahead and secure it.

CAPCOM Yeah, Ken, I think they are going to have fun analyzing that one.

SC I think they've got their work cut out for them. Are there any questions that you might want to get resolved and maybe that were obvious to me but weren't obvious to you before we put it all away? We're going to be closing down here in a couple of minutes.

CAPCOM Okay, the PI is back there and hopefully he is working out some questions.

CAPCOM Jim, Houston.

SC Go ahead.

CAPCOM Okay, one you said that you tapped the box there at the beginning to try to get rid of the bubbles, how long did you wait before you started? I know you gave a mark, but we'd like to verify that.

SC Between the time we tapped the bubbles and the time we started the experiment?

CAPCOM That's affirm.

SC Is that the time frame? Okay, that time frame was - I would guess it was about a minute because when I tapped it, I just couldn't get them to move. I had already - I had already tapped that thing once before, for the bubbles, and because well, as soon as we unpacked them we saw the bubbles out there and I banged it a little bit to try and see if I could get them to move and didn't have any luck at all. So we didn't wait any 3 or 5 minutes on that - it was about 2 minutes, I guess.

CAPCOM Okay, we copy that, 2 minutes. And on the tube 1, did you notice any separation of the two sizings?

SC Not unless that's what this diffuse and central feature turns out to be. Because the dark, oh, I need to rephrase that, the higher concentration material that makes it look more solid (and that's a large particle in the diffuse material is the finer particles), then I would say that perhaps there was a separation of small particles from larger ones

in tube number 2 just about the time they reversed it, just starting to show up and number 1 perhaps the same. The number 3 I would say if that is the proper interpretation that there was no appreciable separation of any of them. And I'm not sure that number 1 ever exhibited the symptoms number 2 did. I can't tell you right now which of these tubes spurted these blobs of particles under the window either..

CAPCOM All right, we copy that. We - I sort of expected some information that I got here that 1 would be the one that split up in the two sizes, but I guess we'll have to look at that later.

SC Okay, again, I'm not sure what this little burst of material that got out on the window might be maybe the loss of stuff from one of them.

CAPCOM Okay. That's all the questions I have here. At least the bugs didn't eat the particles.

PAO Apollo Control Houston 25 hours 48 minutes ground elapsed time. We've had a continuing discussion with Command Module Pilot Ken Mattingly on the electrophoresis demonstration. We now show Apollo 16 at 106,097 nautical miles out from the earth and traveling at a velocity of 4,992 feet per second.

SC Houston, did you get that? That was magazine UU up to frame 55 on that experiment.

CAPCOM Okay, UNCLE UNCLE 55. Thank you.

SC Roger.

CAPCOM Apollo 16, Houston.

SC Go ahead, over.

CAPCOM Okay, at your convenience we've got the change to your SPS burn procedure.

SC Okay, you've got a standby on that one. Things are kind of busy right now.

CAPCOM Right, understand. No hurry at all.

END OF TAPE

PAO This is Apollo Control, Houston at 26 hours 13 minutes ground elapsed time. Lunarly no conversation with the crew of Apollo 16, during a good part of this shift thus far. We now show Apollo 16 at 107,262 nautical miles away from the earth. Velocity now reading 4947 feet per second. Apollo 16's present weight 103,026 pounds. This is Apollo Control Houston continuing to monitor at 26 hours 13 minutes since lift-off.

PAO This is Apollo Control Houston at 26 hours 33 minutes ground elapsed time. We presently show Apollo 16 at a distance of 108,209 nautical miles away from the earth. Velocity now reads 4912 feet per second. We're standing by continuing to monitor, in the event -- we have any conversation with the crew of Apollo 16, but it's been a very quiet shift. We're at 26 hours 33 minutes ground elapsed time. This is Apollo Control Houston.

SC Houston, 16.
CAPCOM Go ahead Charlie.
SC Tony, you just went by my window, and half earth, man, it's a spectacular sight.
CAPCOM Yes, I bet it is. I tell you, I'm green with envy.
SC (garble) I don't want to trade with you.
CAPCOM You say the world looked pretty good when it went by?
SC How far out are we now, Tony?
CAPCOM 108,285.1.
SC Say again. (garble) broken up.
CAPCOM Okay, 108,285.1. Change to .6.
SC Okay thank you.... I think one of the (garble) most impressive sights Tony, is the cloud fall because you could see (garble) polar ice cap.
CAPCOM Very good. Have you had a chance to look long enough to the dynamics at all?
SC Negative. We just now took the shade down on my side. That's the first view I've had all morning.
CAPCOM Very good.
SC What was that awful big storm up off the coast of Alaska in the Bering sea I guess it was yesterday. I can't see that now though. I think you all (garble).
CAPCOM I guess our weather chart doesn't go up that high. I was going to see what we've got there now,

CAPCOM but it only includes your recovery areas. We're reviewing that film that you took -- that TV that you took last night and there are alot of sparklies out the window there. Were those all just loose particles floating around?

SC Yes, the LM was really shedding on that one panel there, Tony, and in fact we've still got quite a few particles floating along with us right now.

END OF TAPE

PAO This is Apollo Control Houston at 27 hours ground elapsed time. We presently show Apollo 16 at a distance of 109 490 nautical miles from Earth and traveling at a speed of 4864 feet per second. Meanwhile in the Mission Control Center we do presently plan for Apollo 16 to perform midcourse correction number 2. This would be at the normal flight plan time 30 hours 39 minutes of ground elapsed time. And the MCC 2 burn would have a Delta V of 12.6 feet per second, and this would be a burn of a 2 second duration performed with the service propulsion system engine. We're at 27 hours 1 minute to ground elapsed time continuing to monitor. This is Apollo Control Houston.

PAO This is Apollo Control Houston at 27 hours 8 minutes ground elapsed time. During this quiet period in the Mission Control Center we are replaying the launch television on one of the large screens. This was the team of flight controllers that was on station during launch, and quite frankly very few had the opportunity to follow the sequence during the -- visually during the actual launch. We presently show Apollo 16 at an altitude of 109 854 nautical miles at a velocity of 4850 feet per second.

SC Houston, 16.

CAPCOM Go ahead, Charlie.

SC Okay, (garble) back up again. Do you want to talk to us about this SPS burn rules? Stand by one, Ken (garble)

SC Okay, Tony, can we go ahead?

CAPCOM Okay, this isn't the burn rules, this is a discussion of procedures for midcourse 2 only. And a change could be noted in your cue card -- SPS cue card -- on the G&C checklist G5-2, but you might want to hear the whole thing before you write it down. Okay, at burn minus 6 minutes, the line that reads SPS helium valves 2 to AUTO should be changed to SPS helium valve 2 to MANUAL for 10 seconds. And after 10 seconds SPS helium valves 2 to AUTO, and then let it remain in AUTO for the burn. And we have a couple of notes to that. First --

SC Now you're talking about going to ON when you say MANUAL, and you don't want us to stay there 10 seconds if it exceeds 200 do you?

CAPCOM That's right. If it exceeds 210 we want you to turn them OFF. And we'll do the burn with them OFF...because if it went to AUTO during the burn we would go right back into the problem.

SC Okay.

CAPCOM Okay, and that was one of the notes and you just anticipated it there. The other note is you may, if we've diagnosed the transducer problem correctly, you'll probably get

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CAPCOM an SPS pressure light. That will go on at
201 pounds.

END OF TAPE

SC Okay.

CAPCOM Right now they are anticipating that by the time of the burn that transducer will be biased about 15 pounds high.

SC Okay, that's the oxidizer side?

CAPCOM That's affirmative.

SC Okay. What is - what do you think is wrong with that transducer?

CAPCOM Right now the note is that the comparison chamber, which should be at about atmospheric pressure, has leaked. And the leak is just making up for the normal absorption of helium, so the gauge is reading about constant. Eventually that comparison chamber will leak down to zero and then you will be comparing, instead of comparing at 14.7 you will be comparing to zero and it will read 15 pounds high.

CAPCOM We are reading about 11 pounds high now.

SC Okay, our gauge has been constant since lift off.

CAPCOM Right. We can read the pressure clear on down the line and in the fuel side the tank pressure and the pressure down the line are tracking right along and they should be in the oxidizer side, but on the oxidizer side the tank's staying constant and the one down the line is dropping down as it should. So either the one in the tank is just locked up or the leak out of the comparison chamber is just making up the difference.

PAO Apollo Control Houston at 27 hours 34 minutes Apollo 16 now 111 051 nautical miles away from the Earth. Velocity now reads 4806 feet per second.

CAPCOM Charlie, Houston.

SC Go ahead.

CAPCOM Just so there is no misunderstanding here I'd like to verify this procedure. We are going to manual for 10 seconds at 6 minutes before the burn and then nominally we'll go back to auto even if you get a caution. The only point where we'd go to off would be if it went above 210.

SC Okay, copy. At 6 minutes helium valves go to manual for 10 seconds, then to auto. If pressure goes greater than 210, then go to off. If we get a caution light but less than 210, we still stay in auto.

CAPCOM That's right.

PAO Apollo Control Houston at 27 hours 37 minutes into the mission. That was CAPCOM Tony England up dating the crew of Apollo 16. The procedure is for the midcourse correction number 2 burn, which is ---MCC2 was scheduled for 30 hours 39 minutes ground elapsed time and that would be a 12.6 foot per second burn with the duration of 2 seconds using

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PAO the service propulsion system engine. We are 27 hours 38 minutes ground elapsed time. Apollo 16 now 111 245 nautical miles away from the Earth. Velocity continuing to decrease and now reading 4799 feet per second.

SC Do your guys feel like that your transducers are good ---- What I mean to say is, do you feel like your telemetry is good on the SPS tank pressure.

CAPCOM Stand by 1, Charlie.

END OF TAPE

CAPCOM Charlie, Houston.

SC Go ahead.

CAPCOM Okay, the telemetry here, the telemetry is good and we can read from the transducer that your reading your oxidizer tank pressure, we can also read from the inlet pressure transducer, which you can't read on board. The inlet pressure transducer indicates that nominal decay and pressure due to helium absorption by the oxidizer. And this looks just like all the other flights. The other one, is the one that you are reading, and it looks like it's locked up. The reason for the procedure that we've sent up is to make sure that we know the pressure in the lines before this burn, which will give us a baseline to plan the management during the LOI.

SC Well, okay. That's what happened (garble) talking in here about how we're going to monitor the LOI.

CAPCOM Right, that's our concern too and what we're trying to do is get enough unknowns out of this mid-course so that we can have a good handle on the LOI.

PAO This is Apollo Control, Houston, at 28 hours and 4 minutes, into the Mission. We presently show Apollo 16 at the distance of 112,448 nautical miles away from the Earth and now traveling at a speed of 4755 feet per second. We're standing by continuing to monitor any conversation which has been quite sparse through the past several hours of the flight, but we will continue to do that and this is Apollo Control, Houston.

END OF TAPE

SC Houston, Apollo 16. Over.
CAPCOM Go ahead, John.
SC Roger, the bias test is completed at the
end of a minute 40 seconds. We got 102.0 on Delta-V counter.
CAPCOM Okay 102.0.
PAO This is Apollo control, Houston at
28 hours 10 minutes. That was Apollo 16 Commander John Young
reporting that the MS bias check was completed. We presently
show Apollo 16 at 112 740 nautical miles away and now traveling
at a speed of 4 744 feet per second. Thus far during this
shift the white team of flight controllers it's been very
straight forward by the books very little conversations be-
tween mission control and the flight crew. We standing by
and continuing to monitor at 28 hours 11 minutes this is
Apollo control, Houston.

END OF TAPE

CAPCOM Apollo 16, Houston.
SC Go ahead.
CAPCOM Okay, we've got a few more questions on that paint shredding. When you have a break, if you'll give us a call, we'll send them up to you.
SC Okay, Tony, go ahead.
CAPCOM Okay, last night during the TV show, the lighting wasn't ideal, maybe you have observed something that we couldn't see in the tapes here. Okay, that panel behind the docking target -- was it completely covered with the shredded material? There's an access panel right in the middle of that -- of the over all panel there -- and we're curious to know if it was just in the access panel, or the whole panel.
SC Okay, Tony, it was on the w-h-o-l-e panel.
CAPCOM Okay, how about any other panels around. It looked like on TV there might be some on that panel just to the right, and so, do you have any words on any other panels?
SC Okay, it's on that whole section there, Tony. There's 2 triangular panels, one on each side of this rectangular pattern which is right below the docking target. That whole section that is parallel of the plus X, below the docking target, the 2 triangular panels and the rectangular pattern all are shredded.
CAPCOM Okay, we copy that.
SC (garble)
CAPCOM Say again?
CAPCOM Was there any gold mylar kapton visible on the panel behind the docking target?
SC Negative. It's apparently just a black surface now, most of the white looking paint, or whatever it is, is all -- most all gone now, there's just a -- well, I'd say maybe a 10% of the surface is now covered with this shredded white stuff.
CAPCOM (garble) to that question was there was some question whether the panel may not have come off entirely and underneath that is some of the mylar stuff.
SC Well, the panel is still on, in fact you can't see the mylar. Below it is a black surface. It looks much like the top of the ascent propellant tank.
CAPCOM Okay, and I guess you mentioned last night there was some streaming of the paint as it was coming off. Was there a preferred direction -- or what was it?
SC Yes, radially -- well, for awhile it was radial to the X axis. Almost right out over the ascent module at the Y axis.
CAPCOM Was it independent of your jet firings?
SC When Ken fired the jets, it really blew it off then.

CAPCOM In the same direction?

SC No, it made it go the other way down towards the leg of the LM.

CAPCOM Okay, without the RCS band it was almost at right angles, to the panel, and otherwise, it was going down towards the legs.

SC Yes, and it looks like -- like John said, right now, Tony, as we come around into the Sun, there's some particles coming out off now more towards quad 2, and it looks like it's on the under side of this panel as we cannot see it, and, but it's between quad 2 and the abspropellent module -- correction the abspropellent tank.

CAPCOM Okay, we're looking at the drawing here and see where you mean.

SC Say again?

CAPCOM Roger, we copy that, Charlie. What we're searching for on this direction of flow is if you think there's anything in the area that might cause it to stream out like some -- a leaky tank or anything of that sort, or whether it's just seems to be almost random.

SC I say again Tony, you cut out all after what we're searching for.

CAPCOM Okay, what we're searching for here is just -- we don't think there is any leak over there, anything of that sort, but if there is a preferred direction of flow we're looking for indication of what it might be so we'll know where the flow is coming from.

SC Tony, please you're for some reason you weren't uplinking, and we've had all after what we're searching for.

CAPCOM Okay, stand by a second, Charlie, I'll be back with you in a minute.

END OF TAPE

SC ... what their searching for.
CAPCOM Okay, stand by a second, Charlie I'll be back with you in a minute.
CAPCOM Okay, Charlie, Houston. How do you copy now?
SC We're five by.
CAPCOM Okay, we were just searching around here a little bit for a possibility might be that we had a small leak in there or something that was causing the peeled paint to flow off in a particular direction. We were just wondering if you any indication that might be the case or whether it's just flying off at right angles.
SC Well, when we first saw it that was our opinion also, but now that most of its gone - it's sorta just coming off in different directions, over.
CAPCOM Okay, we copy that.
SC And, Tony the stuff that - is really not white it's more of a gold looking color or sandy color now.
CAPCOM Okay. Thats the shredded stuff your talking about?
SC That affirmative.
CAPCOM Alright, the thermal people aren't upset about this at all they don't think it will give us any constraint. Evidently that surface was only on there for the very high sun case.
SC Okay. Well, the panel is intact underneath that paint job whatever it was. The panel apparently is intact.
CAPCOM Okay. Okay, Charlie I guess that's the whole set of questions there everybody is very happy with what we're hearing.
SC Tony, the panel that shredded the ones that we were telling have some more pronounced wrinkle ridges in them than any of the other panels.
CAPCOM Okay, we copy that, Charlie. We'll find out what that means.
PAO This is Apollo control, Houston at 28 hours 36 minutes ground elapse time. We presently show Apollo 16 at 113 903 nautical miles away from the earth and traveling at a speed of 4 703 feet per second. The exchange that you heard between Charlie Duke the Lunar Module Pilot aboard Apollo 16 and capcom Tony England dealt, of course, with the paticles that were sited first yesterday evening. The Grumman thermal people who operated one of the staff support rooms, here have identified it as not being a problem, and here in mission control we're attempting to acquire more precise explanation for the behavior of these paint particles. We're at 28 hours 37 minutes ground elapse time and this is Apollo control, Houston.
END OF TAPE

PAO This is Apollo Control, Houston at 28 hours 52 minutes ground elapsed time. Our displays presently show Apollo 16, at a distance of 114,597 nautical miles away from the Earth. Velocity now reads 4678 feet per second. We're at 28 hours 52 minutes and this is Apollo Control, Houston.

PAO This is Apollo Control, Houston at 28 hours 57 minutes ground elapsed time. Apollo 16 now 114,858 nautical miles away from the Earth. And now traveling at a speed of 4669 feet per second. In the Mission Control Center we're in the process of a shift change over. This being the orange team of flight controllers replacing the white team of flight controllers and we're at 28 hours 58 minutes into the mission. This is Apollo Control, Houston.

SC Houston, 16, do you read?

CAPCOM Go ahead, 16.

SC Okay, did you read, John, there?

CAPCOM Negative.

SC Okay we're exiting PTC and going to the far UV attitude.

CAPCOM Roger.

PAO This is Apollo Control, at 29 hours 14 minutes. We've completed our shift hand over in Mission Control, flight director, Pete Frank, has been checking with his flight controllers, he'll be going around the room shortly and getting a status and briefing for the things that will be going on during this shift. We will have a change of shift press briefing that is scheduled to begin in about 10 to 15 minutes and will be in the news center briefing room. Participants in the briefing will be, flight director Gene Kranz, and flight surgeon Dr. Royce Hawkins. That again will be in about 10 to 15 minutes in the MSC news center briefing room.

CAPCOM 16, we've got a state vector and a target load whenever you're ready to accept.

SC You've got it.

CAPCOM Roger, thank you.

SC How long you been down there?

CAPCOM Oh, about 20 minutes.

SC How's the weather down there today, Pete?

CAPCOM Beautiful. A little warm. And Charlie, you're right over the Gulf of Mexico.

END OF TAPE

SC Charlie, you're right over the Gulf of
Mexico.
SC Looking out his window he said that you guys
are still there.
CAPCOM Say again, Ken.
SC Looks like you guys are still there.
CAPCOM We're still here.
SC What did you say about the Gulf, Pete?
CAPCOM Yeah, you should be right directly over
the Gulf of Mexico.
SC Yeah, I was thinking the same thing.
That we could see it anyway.
CAPCOM Apollo 16, you can have the computer.
SC Thank you. Do you want us to go to
Delta now or you guys want to hang on to our antennas?
CAPCOM Rog, you can stay there.
PAO This is Apollo Control. We are ready to
switch now to the MSC News Center Briefing Room for our change
of shift press briefing.

END OF TAPE

PAO This is Apollo Control, at 29 hours 52 minutes into the flight of Apollo 16. During our change of shift press briefing, the crew aboard the spacecraft has been completing preparations for their first midcourse correction on the translunar leg of this flight. That midcourse coming at the second opportunity, at a ground elapsed time of 30 hours 39 minutes. And they have now completed aligning the guidance platform which is used as an attitude reference for the maneuver. The burn will be performed with the service propulsion system engine in the service module and will be 12.6 foot per second maneuver. Burning the engine for 2 seconds. We've accumulated about 4 minutes of taped conversation with the crew and we'll play that back for you now and then stand by live.

SC Houston, do you have the angles?

CAPCOM Affirmative, we got.

SC Torqued at 39 30.

CAPCOM Roger. And 16 we've got the MCC 2 pad and the high gain antenna angles for MCC 2 whenever you're ready.

SC Okay, Houston, go ahead with your pad.

CAPCOM Okay, MCC 2, SPS, G&N 66768 plus 124 minus 011 030 39 0001 NOUN 81 is plus 00089 minus 00011 plus 00089 094 354 010 NOUN 44's are N/A Delta VT 00126 002 00083. Sexton star forward 0 2564 303. ACCEPT of the pad is NA, set stars are Sirius and Rigel 219 166 313 ullage none, LM weight 36258.

SC Okay, we copy, MCC 2 SPS slash G&N 66768 plus 124 minus 011 030 3900 01 plus 00089 minus 00011 plus 00089 094 354 010 NA NA 00126 002 00083 plus 0564 303 rest of the pad is NA. Sirius and Rigel 219 166 313 no ullage, LM weight 36258.

CAPCOM That's affirmative, Charlie. You are ready for the high gain angles.

SC Go ahead.

CAPCOM Okay, PITCH minus 46, YAW plus 0.

SC Okay, PITCH minus 46, Yaw plus 0.

C CAPCOM Roger.

SC Is that it? Okay, Houston, we turned on the hydrogen purge line heaters, maybe we can get this purge off our hair early.

CAPCOM Roger, copy.

SC Houston, can we do this waste water dump now or do you want us to wait closer in?

CAPCOM Stand by one minute, John----

END OF TAPE

SC Until we're closer in.
CAPCOM Stand by one minute, John, we'll check it.
CAPCOM John, we'd prefer you wait till after the sexton star check.
SC Okay. I'll tell you one thing about that sextant business, Don, we got so many particles off the LM out there I don't believe you could recognize the star pattern. And the telescope hammer but they show up just perfect in the sextant.
CAPCOM Roger.
SC It sure makes you appreciate one of these non-drifting platforms.
CAPCOM Rog. Ken, if your ready you can do that water dump any time you want.
SC Oh, we'll go ahead and do that. Do you have any objections to our going ahead and going to the attitude?
SC You're really crowding the length of time it's going to take to dump the water up against the burn time.
CAPCOM Yes, you can go ahead and attitude or do the water dump which ever you want.
SC Okay, we'll go ahead and go to attitude and see what we have for time. We'll get the star check off in the first priority.
CAPCOM Roger.
SC Pete, we go to stop charge and bat A now?
CAPCOM Roger, 16. And 16 you can delete charging battery A after the burn. It's charged sufficiently.
SC Okay.
CAPCOM 16, I've got some gyro drift updates and triple bias for you. When you're ready to copy.
SC Okay, go ahead.
CAPCOM Okay, the gyro drift, I'll give you addresses and numbers, address 1460 77552, address 1461 77756, address 1462 77307.
SC Okay, that's 1460 77552, 1461 77756, 1462 77307.
CAPCOM That's affirmative. And on the triple bias, the address is 1456 76747, OMNI Alpha 60.
SC Okay, 1456 76747.
CAPCOM That's affirmative and did you copy OMNI Alpha?
SC Okay OMNI Alpha.
CAPCOM Roger.
PAO This is Apollo Control at 30 hours 11 minutes. We are now about 28 minutes away from the scheduled ignition, for the midcourse correction. The first to be performed on this leg of the flight to the Moon. That maneuver again will be performed with the spacecraft service propulsion

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PAO system engine. It will be a burn of about
2 seconds duration. Providing about 12.6 feet per second in
velocity change.

CAPCOM Stand by one.

CAPCOM Where're your ACQ and narrow, Charlie?

END OF TAPE

SC Okay, the star checks out good. It's right in the middle and the waste water dump is insork.

CAPCOM Say, again John, I didn't copy that.

SC Star checks good, it's right in the middle and the waste water dump is in work.

CAPCOM Roger.

SC Don, could you tell us if the Delta VC number you gave us includes any kind of a bias to compensate for the minute of EMS on time prior to ignition?

CAPCOM Just a moment.

SC Yeah, I'm not asking for one, I'm just asking if that's in there.

CAPCOM Okay, standby, we'll check it.

SC Okay, we are terminating the waste water dump now.

CAPCOM Roger.

CAPCOM Ken, the pad does take that into account.

SC Okay, thank you sir.

PAO This is Apollo Control at 30 hours 29 minutes. We are now about 10 minutes away from the scheduled ignition time for the midcourse correction maneuver to be performed with the spacecraft service propulsion system engine. A very short burn of about 2 seconds duration. This maneuver will change the point of closest approach to the moon from it's present value of about 117 nautical miles down from the desired altitude of 71 nautical miles at which point the lunar orbit insertion maneuver would be performed placing the spacecraft in the nominal 58 by 170 nautical mile orbit about the Moon. Again that maneuver now is scheduled to be performed 9 minutes 30 seconds from now. At the present time Apollo 16 is 118 926 nautical miles from Earth, traveling at a speed of 4528 feet per second. Flight Director Pete Frank has checked the status with all of his Flight Controllers and we appear to be in good shape for the maneuver. The crew has completed virtually all of the activities prior to the midcourse correction and everything looks good at this point.

SC We pressurize the pressure in the SPS now.

CAPCOM Roger.

SC Okay, Houston, I'm looking at oxidizer pressure of just about 210. We are going to leave the valves in auto.

CAPCOM Roger.

END OF TAPE

SC We're looking at oxidizer pressure, just about 210. We're going to leave the valves in auto.

CAPCOM Roger.

PAO This is Apollo Control. We are now about 3 minutes away from the ignition of this midcourse correction. Everything continues to look good. The spacecraft is in the proper attitude, the SPS tanks are pressurized. And we're now 2 minutes 35 seconds from ignition. Now 1 minute from ignition. Coming up on 10 seconds to ignition. And our guidance officer reports the burn is complete. It was scheduled to be a 2 second burn with a change in velocity of 12.6 feet per second.

SC Well the old burn complete, Houston. It's a big boot.

CAPCOM Roger.

PAO And we're still waiting for the preliminary numbers on that burn. Our first reports from the guidance officer--

SC Houston, do you want a burn report or did you all see everything?

CAPCOM Stand by one. 16 we'd like a burn report.

SC Okay, Delta tik was 0 burn time was on my watch .1. We got trim within an attitude of 094 352 008 plus .1 minus 0 plus .1 Delta VC minus 3.1. Fuel is reading 010 and OX 010 no unbalance.

CAPCOM Roger, copy.

SC And on board our fuel -- okay, Pete on board, the fuel--during the burn the fuel pressure dropped to 170 and the oxidizer dropped to 200.

CAPCOM Understand 170 and 200.

SC Okay, Houston, our LM CM Delta P is .8, you want to go ahead and do the tunnel vent to, vent till greater 2.7, right?

CAPCOM Affirmative.

SC Houston, what's your best guess on how long this baby will get to 27 if it started off at .9?

CAPCOM Stand by one, I'll get you a number. They are saying an hour and 50 minutes.

SC That's about what we -- that's about what it looks like to me.

CAPCOM Rog. Understand. John, you using Charlies' wrist watch to get that number?

SC Rog. Just remember how small that tunnel vent hole is.

CAPCOM Rog.

PAO This is Apollo Control at 3 hours--at 30 hours 52 minutes. It'll probably be on the order of 2 to 2 and 1/2 hours from now before the flight dynamics officer has sufficient tracking data to confirm that the midcourse correction had the desired effect. That being to lower the

PAO point of closest approach to the Moon from the value that we had prior to the maneuver of 117 nautical miles down to the desired altitude of 71 and also to place the spacecraft arrival time at the desired flight plan time. The preliminary numbers however did appear to be normal and we'll be confirming that with tracking data. At the present time the crew is beginning preparations for entering the lunar module. This is for the second time and at present they are venting the tunnel, the docking tunnel between the LM and the command module. So that they have a differential pressure of about 2.7 pounds per square inch, between the tunnel and the command module. The command modules' cabin pressure is somewhere around 5 to 5 and 1/2 pounds per square inch. This venting is being done to remove as much of the atmosphere from the LM as possible within a reasonable amount of time. The first time that we went into the lunar module last night the atmosphere in the command module still contains a small percentage of nitrogen of course at launch we're launching 60% oxygen, 40% nitrogen, and this is gradually replaced with pure oxygen in the command module. By going into the lunar module, earlier than normal, the amount of nitrogen that's allowed into the lunar module is greater than normal and therefore in order to have the oxygen content in the LM as close to pure oxygen as possible we are venting the lunar module down, the cabin will then be pumped up again prior to ingress, with pure oxygen and using this procedure we remove as much of the nitrogen as possible from the lunar module cabin. The estimate on this venting procedure is that it would require about an hour and a half. And we don't expect this to have any effect on the flight plan schedule for the crews' entering the lunar module. This should occur as it is planned in the flight plan. At the present time Apollo 16 is 120000 nautical miles from Earth and the spacecraft velocity is down now to 4486 feet per second.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/17/72 CST 18:49 GET 30:54 109/1

CAPCOM 16, would you verify H2 tanks 1 and 2,
heaters off and H2 tank 3 fan auto?

SC Oh, oh, we got the tanks 1 and 2 heaters
in auto and fan 3 in auto, will turn H2 heaters 1 and 2 off.

CAPCOM Ah, Roger, thank you.

END OF TAPE

PAO This is Apollo control at 31 hours 34 minutes. Things have settled down in to a rather quiet routine here in mission control and we presume aboard the spacecraft. At this time the Apollo 16 crew should be eating what would be lunch for them, following that they will begin preparation for the transfer to the lunar module the second of this flight, of course the first coming last night unscheduled entry. And during this scheduled entry this evening Duke and Young will be powering up the communications and instrumentation systems aboard the lunar module. We'll check out the communications circuits with them and also give the control center here a chance to look at all of the major systems on the lunar module once the instrumentation to all of these systems is powered up. Normally, during the trans-lunar leg of the flight the only instrumentation, the only readings that we have on the LM is the amount of power that is transferred from the command module to the lunar module, and during this entry into the LM Duke and Young will be powering up the bulk of the instrumentation that will allow us to look at all critical systems. They will also be transferring most of the items from the command module that they will need for operations in the lunar module later in the mission and stowing these in the LM.

SC Okay, Houston. We're up the 2.1 on the LM CM Delta P gauge now.

CAPCOM Roger, copy 2.1. And while I'm talking to you on this oxygen tank pressure gage it's starting to look like there is a bias in there of about 14.7 due to the fact that the reference chamber has apparently leaked its ore atmosphere reference. Now your down to probably a vacuum. And that coupled with a 5 psi meter bias should give you a total bias of about 20 psi on oxygen tank pressure. But the gage seems to be working okay except for that bias so we're going to continue to follow it so we can give you a better number prior to LOI.

SC Thank you, Pete.

CAPCOM Roger.

SC Houston, 16. Over.

CAPCOM Go ahead.

SC Okay, Pete, I just took my window shade out of my rendezvous window and looking out at quad 1 of old Orion. The thermal shield that sits directly inboard of the quad that's facing the plus Z direction it's a little piece about 3 feet long by about a foot wide. It's beginning to peel also, now. Over.

CAPCOM It's doing the same thing as the panel we looked at last night.

SC That's affirm, except for - it's not nearly as bad it's just primarily on the inboard side, but

APOLLO 16 MISSION COMMENTARY 4/17/72 CST 19:09 GET 31:14 110/2

SC it is beginning to get the shredded wheat
appearance like the other one. Over.

CAPCOM Roger, understand.

SC Pete, on the outboard side right out near
the quad or right above the quad on that same panel it seems
to me it's beginning - it looks like it starts out with a
very fine shaggy grass type stuff and it's slowly peels up
into the shredded wheat type. Over.

CAPCOM Roger, understand.

END OF TAPE

CAPCOM 16, Houston, when you get a minute, we've got an addition to the flight plan at 32 48.

SC Roger, go ahead with your 32 48 addition.

CAPCOM Okay, we want to add a note to read the LM CM Delta P. And we want to get that prior to that CM LM pressure equalization decal.

SC Okie dokie.

CAPCOM And Ken, we've made an ink correction on the back of that AOS LOS sun wheel aid there. And when you get around to digging that out, I can give it to you, or I can pick it up later.

SC Ken's busy right now, say again, over.

CAPCOM Okay, on the back of the sun wheel -- the AOS LOS sun wheel, we've entered an ink note to account for the fact that we change REFSMMAT in the middle of his work there. We made an error on it, we've got to change the note now and sometime when he's got that wheel out, I can read him up the correction.

SC Okay.

PAO This is Apollo Control at 32 hours 5 minutes. A few minutes ago Charlie Duke reported additional paint apparently peeling from another of the aluminum skins on the Lunar Module, and from Duke's description this appeared to be one of the surfaces in the area of quad 1 on the Lunar Module. This would be a quad adjacent to the commander's station in the crew compartment. And Duke said that there were about 3 square feet of surface area involved. He described the appearance of the surface about as the other surface which had also peeled. Ranging from what he said was a kind of a sprouting grass appearance to shredded wheat. Now at the present time, the crew is awaiting the pressure differential between the docking tunnel and the Command Module, to reach 2.7 lbs. per sq. inch. At the last report from John Young the difference in pressure as the tunnel is vented, had reached 2.1 lbs. per sq. inch. The crew is scheduled to begin entering the Lunar Module to power up the communication system and turn on the instrumentation so that we can get a complete look at most of the major systems on the Lunar Module, here on the ground through telemetry. And flight plan calls for them to enter the Lunar Module at about 33 hours 5 minutes, or a little less than one hour from now. At the present time Apollo 16 is 123 126 nautical miles from Earth, and traveling at a speed of 4382 feet per second.

END OF TAPE

PAO This is Apollo Control, at 32 hours 26 minutes. Here in the control center the lunar module control officer has replayed the tape of Charlie Duke's description of the additional surface of the LM that appeared to be peeling. Where the paint was peeling, similiar to the way panels below the docking target were reported peeling yesterday. From Dukes description we were not able to pin point the precise panels involved although it is obviously very close to the area, that was reported peeling previously. And appeared much the same from Dukes description, the paint which is painted on the very thin aluminum skin in this area of the LM to provide a small margin of additional thermal protection in worse case conditions where the lunar module is exposed to greater sun angles than we will be seeing on this mission. The paint on those surfaces is as Duke described them giving the appearance of sprouting grass and then peeling back even further and giving the appearance of shreaded wheat. Duke said that the area involved is about 1 foot by -- 1 foot by 3 feet. And was in the area of Quad 1, which is one of the reaction control systems thrusters Quads located adjacent to the commander's station in the lunar module ascent stage. General Jim McDivitt, who is in the control center at the present time advised Pete Frank, that the studies that Grumman has done, the manufacturer of the lunar module, show that even if all of the surfaces on the LM which are painted in this manner were to lose their paint that the effect would be minimal and would cause no concern as far the temperatures of the lunar module are concerned. We expect that we will get further information at the time the crew enters the lunar module and also we will be looking at all of the pertinent systems, all of the critical systems aboard the lunar module and are getting a comparative set of numbers to go with those that we saw last night. And all of the engineers here in the control center and the back rooms, the staff support rooms, and in building 45 at the Manned Spacecraft Center will be looking at this data very closely and comparing it with the information that we got when the LM was powered up last night.

SC Okay, Houston, we're maneuvering to the attitude.

CAPCOM Roger.

SC Okay, Houston, we got 2.7 on the tunnel vent right now.

CAPCOM Roger, copy, 2.7--

SC LM, CM Delta P.

CAPCOM Roger, LM, CM Delta P.

SC LM, CM, Delta P.

CAPCOM Okay, we copy.

SC (garble)

END OF TAPE

SC Okay, Houston, we're going to come on with the correct 02 and power up the cabin.

CAPCOM Roger.

SC How does that look Houston, is that about 5 17?

CAPCOM We're showing about 5 5 John.

SC Okay.

CAPCOM John, they say that's good enough now.

SC Okay, direct 02 is going closed.

CAPCOM Righty.

SC Okay and the LM/CM Delta P is 3.3.

CAPCOM Roger, stand by a minute.

CAPCOM 16, we want to continue LM venting until you have a reading, Delta P reading of 3.4 on the meter and that should take less than 10 minutes.

SC Okay, we copy. We'll go to 3.4.

SC Okay, we're in LM vent.

CAPCOM Roger.

SC Okay, Houston, it's an honest 3.4.

CAPCOM Roger, copy.

SC We're clear to proceed, over.

CAPCOM Roger, Ken.

SC Okey, Dokey.

PAO This is Apollo Control at 32 hours 58 minutes. The LM cabin has now been vented down to the desired pressure level and the crew will shortly begin repressurizing the cabin to about 5 to 5 and a half pounds per square inch. Following that they will be preparing to enter the lunar module. I expect that will require about 5 to 10 minutes. The flight plan calls for them to be in the LM by about 33 hours and 5 minutes or about 7 or 8 minutes from now. They will have to remove the tunnel hatch, the probe and drogue assembly, and then crawl through the tunnel into the lunar module. Following that they have about 30 minutes or so of housekeeping activities aboard the LM and then they will activate the communications system and run a series of communications checks with Mission Control. Our LM systems engineer has just reported that they are beginning the activities toward repressurizing the lunar module. During this entry into the LM they will also be powering up the data systems that will allow us to get a good look at all of the major systems on the lunar module through the telemetry and we'll have teams of engineers here in Mission Control and in the engineering support rooms in Building 45 here at Manned Spacecraft Center looking at this data very closely and comparing it with the similar measurements that we got yesterday from the crew that made their unscheduled, previously unscheduled entry into the LM. At the present time Apollo 16 is 125 324 nautical miles from Earth and we are continuing to watch the spacecraft velocity drop off. It is down to 4310 feet per second.

END OF TAPE

SC Okay, Houston, we're about ready to re-
move the hatch.

CAPCOM Roger.

PAO That was Charlie Duke reporting that the
crew was about ready to remove the hatch allowing them to
get into the LM tunnel remove the probe and drogue assembly
which will clear the tunnel and allow them to enter the
lunar module.

SC Houston, Charlie's floating on over to
the lunar module now to check out old Orion.

CAPCOM Okay.

PAO That was John Young reporting that Charlie
Duke as he put it, "floating over to the lunar module now".
That report came at 33 hours 14 minutes, and we expect that
Young will be following shortly.

SC Extend that docking tunnel index minus 3.5.

CAPCOM Minus 3.5.

PAO This is Apollo control. We're awaiting
the first bits of data from the lunar module as Young and
Duke begin partially powering the vehicle up. The flight
dynamics officer just reported that as a result of the mid-
course correction performed at 30 hours 39 minutes the space-
craft appears to be on the desired trajectory and will be
approaching the moon at an altitude of about 71 nautical
miles at its closest point prior to the lunar orbit insertion
maneuver. This is the preplanned value. We also have an
update on the predicted impact point for the Saturn third
stage the S-IVB. The new coordinates that we now have for
that impact point are 1 degree 50 minutes north and 23 degrees
18 minutes west. This is slightly closer to the planned
target point of 30 degrees west and the coordinates we got
last night as I recall those had us about 22 1/2 west we're
now showing about 23 degrees 18 minutes west so moving a
little bit more westerly as we continue to get additional
tracking on the S-IVB. And the expected impact time is
75 hours 7 minutes 3 seconds ground elapsed time.

SC Houston, Casper.

CAPCOM Go ahead, Casper.

SC Rog, Don. Did you guys get the total
index?

CAPCOM We've got it, Ken.

SC Okay. And, Don, I'm holding off on the
oxygen heaters I'm keeping them all three in AUTO until we
get the surge and repress tanks built back up. If that's
okay, if you would like for me to turn them off I can recon-
figure now, otherwise I would like you to help me remember
not to leave them on.

CAPCOM Roger, we concur, Ken. We'll remind you.

SC Okay, thank you.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/17/72 GET 33:24 CST 21:19 MC-115/1

SC

Okay, thank you.

END OF TAPE

PAO This is Apollo Control, at 33 hours 47 minutes. We've heard nothing from John Young and Charlie Duke, since Young reported about 30 minutes ago that they were entering the lunar module Orion. The crew is scheduled to be stowing items that they've carried over from the command module and then we'll begin powering up to lunar module, according to check list that they will be carrying on with them. And shortly after they begin the partial power up, we should see a telemetry data of most of the critical systems aboard the lunar module.

SC Hey, Don, can I talk to you about the docking latch?

CAPCOM Roger.

SC You'll send or do you want me to wait a minute.

CAPCOM No, go ahead.

SC Okay, you remember when we told you at the time that we docked we had a number 10, that didn't look like it had stroked quite the same as the others, but the lock was over the rail. You weren't on board at the time, I tried, we were talking to Gordon, but that's one of the things we reported and the plate (garble) over the bungee fairing is cocked slightly, and now that we've got everything cleaned out of the tunnel I can look in here it's real obvious that the bungee isn't firing completely. It's down, the top of the bungee is recessed about a half of an inch down, it looks like it just half triggered and as a matter of fact I'm looking at the latch and by golly I can see between the latch and the total ring, so it didn't even pull down against that. And I really obviously don't have any concern for it, except I've never seen one look just like this and I was going to go ahead and recock it, and fire it again and see how that worked with a manual trigger, but I got to thinking maybe that's -- maybe it's best to let you folks think about it. The main thing I want to do is make sure it's not a problem in unlatching it when the time comes.

CAPCOM Roger, stand by.

CAPCOM Casper we got all the data we need and we're going to take a look at it. We do not want you to recock and fire the thing manually and we will get back to you later.

CASPER Okay.

CASPER And, Houston, Casper turned over the power supply to Orion at 3358.

CAPCOM Roger, Casper.

PAO With Ken Mattinglys' report that he turned over power to the LM, which came at 33 hours 58 minutes, we would expect shortly to begin seeing telemetry data from the lunar module. Also Mattingly commented on a problem that had

PAO been reported previously and that is that one of the 12 docking latches, on the command module, apparently has not latched firmly around the docking ring of the lunar module, as would normally be expected. This doesn't constitute any concern, 3 of these 12 docking latches are adequate to assure a hard dock, and only 1 of the 12 is not latched down firmly. The belief at the present time is that it's probably just hung up if the thing were fired again that it would engage fully. And it doesn't appear that any thing further will be done with this particular latch. The expectation is that when the 2 vehicles are separated and then docked again that the latch will perform properly. And as we mentioned in any event only 3 of the 12 latches are required for a hard docking. Well we have now started getting LM data, so we will be taking a good look at all of the systems on the lunar module.

CAPCOM (garble) alpha.
ORION Man you're just super on the VHF Alpha, how
me? -- Man that's good stuff isn't?
ORION Just beautiful.
ORION Your just very (garble).
ORION Okay. Go ---- Go ---- Go ---- Go ----Go
Hey Ken, B simplex.
CASPER Orion, Casper, on BRAVO simplex.
ORION Okay, I read you 5 by, Casper, how me?
CASPER Loud and clear.
ORION You're super

END OF TAPE

CASPER Orion, Casper having BRAVO and SIMPLEX.
ORION Okay, I'm reading you 5 by. Casper how me?
CASPER Loud and clear.
ORION You're super.
ORION Houston, how do you read Orion? Over.
CAPCOM You're loud and clear Orion.
ORION Okay, we're coming on down voice back up
and we're on a hot mike and you're loud and clear to us, over.
CAPCOM Roger.
ORION How does the low bit rate look to you
Pete?
CAPCOM Looks good, Orion.
ORION Okay, I'm going up bit rate to the high.
Okay, how do you read me now, Pete?
CAPCOM Loud and clear.
ORION Okay, you're 5 by also, got high bit rate.
CAPCOM Looks good, John.
ORION Okay, we're going to biomed right. How do
you read me now Pete?
CAPCOM Loud and clear.
ORION Okay. We're down to step 5 on page 1-18
Do you want to look at the high bit rate some more?
CAPCOM Negative. We don't want to look at it any
more.
ORION You do not. Rog. We got into low bit
rate. Okay, the book says perform voice and low bit rate
with us then. How do you read?
CAPCOM Loud and clear.
ORION (garbled)
ORION Houston, how do you read with the function
and voice, over.
CAPCOM You're loud and clear.
ORION Okay, you're 5 by and low bit rate, how
does it look?
CAPCOM Low bit rate looks good.
ORION Okay, we're going into high bit rate. And
we'll do the same thing with you - voice check and high bit
rate check.
ORION Houston, how do you read? Then over.
CAPCOM Loud and clear.
ORION Hey, give me a short count please, Pete.
CAPCOM 5 4 3 2 1.
ORION Rog. You're very good. Okay we're going
to - bit rate is going low and we're going S-band range to
ranging.
CAPCOM Roger.
ORION How do you read now? Over.
CAPCOM Loud and clear.

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ORION Okay, how does the ranging check going?
CAPCOM Standby.
CAPCOM Ranging looks good Orion.
ORION Okay, Houston, our EV Bats are both GO
at 37 volts and our sequence camera at work.
CAPCOM Roger, copy.
ORION And John's OPS was 5800 and mine was
6000, over.

END OF TAPE

ORION And John's OPS was 58 000 and mine was
6 000, over.
CAPCOM Roger.
ORION Okay, as far as we're concerned, the com
is just super and we're ready to go on to phase 120 and de-
activate it, if you guys are.
CAPCOM Stand by one on that.
SC Okay, Orion you can deactivate.
ORION Okay, deactivating.
PAO All 11 controllers here in the control
center report that all of the LM systems look good based on the
telemetry data that we're receiving. Apollo 16 at this time
is 128 138 nautical miles from earth traveling at a speed
of 4 221 feet per second. And Charlie Duke reported that he and
Young are now ready to begin deactivating the lunar module
in preparation for going back into the command module and
closing up the hatch.
CASPER Okay, Houston, Casper has LM power back
at 34:19.
CAPCOM Roger, 34:19.
CASPER Affirm.
CASPER Hey, Don, if anyone wonders what I'm
doing with 52 I just wanted to use auto optics to point at
Jupiter.
CAPCOM Roger.
CASPER I'm not going to take any marks.
CAPCOM Roger, understand.
PAO This is Apollo control at 34 hours 35 min-
utes. John Young and Charlie Duke are apparently still in
the lunar module, Orion. They are not scheduled to complete
the close out and return to the command module for another
25 or 30 minutes. During the time that they had the LM
partially powered up and we had telemetry data, all of the
systems onboard looked normal, everything looked very good.

END OF TAPE

CAPCOM Casper, we've got the LOI minus 5 flyby pad whenever you're ready to copy.

CASPER Standby one.

CAPCOM Roger.

ORION We got Casper's keeper over in the Lunar Module taking a peek and we'll be closing it out and get it in a minute.

CAPCOM Roger, understand.

ORION I think you really get to be a real believer in the heating capacity of the Sun. In the Lunar Module here the commander's window is in direct sunlight and it's almost too hot to touch it. My window is in the shade and it's got -- it's frosted over.

CAPCOM Roger.

ORION Okay, we're going to close her out, Pete.

CAPCOM Okay, John.

PAO That was Charlie Duke reporting. He and John Young are going to close off the Lunar Module now, and get back into the Command Module. Duke also gave one observation of the affects of the Sun on heating the vehicle. He reported that the commander's window which was in direct sunlight was almost too hot to touch, and the Lunar Module pilot's window on the other side of the vehicle was frosted over. That window, of course, not in the sunlight. And at this time Apollo 16 is 129 776 nautical miles from Earth. The speed down now to 4170 feet per second.

CASPER Houston, the hatch is closed, the drogue is installed, the probes is installed, the hatch is installed on our side, the LM tunnel vent valve is in LM C and Delta P, the tunnel lights are off, is it okay if we go to PTC instead of PDC now, or do y'all want to wait until 34?

CAPCOM Standby one.

CAPCOM 16, you can go ahead and do the PDC.

SC Okay.

PAO That was John Young reporting the probe and drogue assembly reinstalled in the LM tunnel, the hatch back in place, and a bit of what sounded like blue grass banjo music drifting in from the background. Apparently the music being played on the crew's onboard tape recorder. That report that Young and Duke had completed the activities aboard the Lunar Module and we're back in the Command Module with everything in the LM buttoned up. It came at about 35 hours 5 minutes. We got the report that 33 hours 14 minutes that Charlie Duke had entered the Lunar Module so they did the LOI fly-by pad.

CAPCOM We probably configure changes for you.

SC Okay. if you can hol up for a second on that.

CAPCOM Roger.

END OF TAPE

PAO The total time that Young and Duke were in the lunar module Orion, was about 1 hour 45 to 1 hour 50 minutes and we don't have the precise time on their reentry to the command module, but that would be a fairly good estimate..

SC Houston 16, you can go ahead with the cryo tanks reconfiguration.

CAPCOM Okay, on the cryo tanks, we want H2 tanks 1 and 2 heaters auto, and tank 3 fan off. Oxygen tanks 1 and 2 heaters off, tank 3 heater auto.

SC Okay, Rog. Configuration H2 heaters 1 and 2 auto, O2 heaters 1 and 2 off, 3 we're auto and that's as we had it. H2 tanks 1 and 2 off and 3 off.

CAPCOM Roger.

SC Okay, Houston, you can go ahead with the MR 5 band.

CAPCOM Okay, LOI minus 5, fly by. SPS G&N 66603 plus 124 minus 012 069 28 2627 plus 00398 minus 01189 plus 04229 210 193 346 NA H sub P is plus 00204 04411 107 04365 sextant star, 14 1248 174, the next 3 lines are not applicable. Lattitude minus 2303 minus 16500 11009 36207 1422342. Set stars Cerious and Rigel 219 166 313, ullage none other number 1 burn SPS dock. 2 pad based on PTC REFSMMAT 3 LM weight 36287.

SC Rog. (garble) LOI minus 5 flyby. SPS/G&N 66603 plus 124 minus 012 069 28 2627 plus 00398. I missed Delta ZY, Delta ZC is 04229 210 193 346 HA is NA is plus 00204 4411 107 04365 14 1248 174 NA lattitude minus 2303 minus 16500 11009 36207 1422342. Cerious and Rigel 219 166 313, ullage none, notes are 1 burn SPS dock PTC REFSMMAT LM weight 36287 which is 30 pounds heavier than we had this morning.

CAPCOM Roger, we'll take a look at that and the Delta VY is minus 011

END OF TAPE

SC 67, which is 30 pounds heavier than we
had this morning.

CAPCOM Roger, we'll take a look at that and the
Delta VY is minus 01189.

SC Minus, Roger minus 01189.

CAPCOM That's affirm.

Go.

SC Is that because we took the film over there?

CAPCOM Say again Charlie.

SC I said we took all that film over there,
maybe that's the 30 pounds.

CAPCOM That's affirm, that's where it came from. And
16, we still have this note to go on the Sun wheel.

SC Standby.

CAPCOM I need Charlie, 16.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/18/72 CST 23:37 GET 35:42 MC-122/1

CAPCOM 16, your rates is ok anytime you want to go
into PTC.

SC Okay. Thank you.

CAPCOM 16, OMNI Bravo load and we'll take care of
any antennas.

SC OMNI BRAVO, Houston.

CAPCOM Roger. Thank you.

PAO This is Apollo Control 36 hours now into
flight of Apollo 16. And spacecraft is now in it's passive
thermal control mode. Rotating at the rate of 3 revolutions
per hour. The crew is scheduled to be eating dinner and following
that they have a scheduled 8 hour rest period. Apollo 16 at
the present time is 135,2 - - rather 132 595 nautical miles
from Earth. And traveling at a speed of 4084 feet per second.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4- -72 GET 36:07 CST 00:00 MC-123/1

DEAD AIR

END OF TAPE

PAO This is Apollo Control, 37 hours now into the flight of Apollo 16. Flight that has settled down into a steady, and at the moment a rather quiet routine. This is typically a quiet time of lunar missions with the crew using the time that they have available to review checklists and procedures that they'll be following during the very busy days ahead on the lunar surface and in orbit around the Moon. Also at the present time the crew is scheduled to be in the midst of a -- an eat period, having diner prior to retiring for an 8 hour rest period. We've been watching all of the spacecraft systems here in Mission Control; everything looks good as it has during most of the flight and we show Apollo 16 now 134,939 nautical miles from Earth, traveling at a speed of 4,013 feet per second.

END OF TAPE

CAPCOM 16, Houston.
SC Go ahead Pete.
CAPCOM Okay, just a last few words here. We don't have anything for you except one note to Ken. Earlier you asked about whether or not the pad we read you contained the correct bias for the EMS, we told you it did and we've looked at it a little more now and actually it turns out it did not. The bias on that one was less than a foot per second, I guess. In the future we will include that bias in the pads.

SC Okay, thank you now.
CAPCOM Rog and we're in to copy anytime you can give us the onboard readouts and get into the flight plan at about 37.

SC Roger.
SC Okay, Houston, Bat C is 37, RO Bat A is 37, RO Bat B 37, RCSA is reading 87, RCSB - 92, RCSC - 93, RCSD - 96. Is that what you wanted, the quantity of the RCS?

CAPCOM That's affirm.
CAPCOM And we copied 37, 37, 37, 87, 92, 93, and 96.

SC That's correct and the main Bus A is reading 29 plus volts.

CAPCOM Ken, for your information, the PTC looks beautiful, in fact it was so good it took some of us quite a while to realize you were in a PTC.

SC Jim, my attitude hold looks a lot like that too.

CAPCOM Rog.
SC It's all in the technique, for the way you hit procede.

CAPCOM Roger, honest.

END OF TAPE

SC Houston, let me read you this cryo tank configuration, and you tell me if that's what you want for the sleep period.

CAPCOM Okay. Play it 16, we're - -

SC (Garble.)

CAPCOM Go ahead, 16, we're ready to copy the cryo configuration.

SC Okay. H2 heaters are - 1 and 2 are in AUTO. O2 heaters 1 and 2 are OFF, 3 is in AUTO. H2 fans 1 and 2 are OFF, and 3 is in AUTO.

CAPCOM 16, the H2 tank 3 fan should be OFF.

SC Okay. H2 tank 3 OFF. And, Houston, for your informational (garble), the gage has not moved since we equalized the two vehicles.

CAPCOM Roger. Understand, 16. And, 16, would you verify optics power OFF?

SC No sir, we aren't ready to turn it OFF yet.

CAPCOM Okay.

SC Houston, 16. Over.

CAPCOM Hello, 16. Houston.

SC Are you ready for a VERB 74?

CAPCOM Roger. We stand by. Go ahead.

SC What did you do with the graveyard shift, Hank?

CAPCOM Oh, that's lots of fun. I get to watch Al snooze.

SC Okay. Direct O2's (garble) coming up now.

CAPCOM Roger. Copy.

END OF TAPE

CAPCOM A mod complete, 16.
SC Thank you.
SC Okay, Houston. Direct 02 is off.
CAPCOM Roger. Copy.
PAO This is Apollo Control at 38 hours in flight of Apollo 16. And we expect the crew will be beginning their scheduled 8 hour rest period shortly. Out here in Mission Control we're in the process of a shift handover. Flight Director Gene Kranz and his white team of flight controllers are coming on now to replace the orange team headed by Flight Director Pete Frank. The capsule communicator on this shift will be astronaut Hank Hartsfield replacing astronaut Don Peterson in that position. And at the present time Apollo 16 is 137 239 nautical miles from Earth. Traveling at a speed of 3945 feet per second.
PAO This is Apollo Control. I would like to correct one portion of our last announcement on the shift handover. The Flight Director on this shift will be Phil Shaffer rather than Gene Kranz. At 38 hours 4 minutes this is Apollo Control Houston.
SC Houston, Casper.
CAPCOM Hello, Casper. Go ahead.
CAPCOM Casper, Houston. Go ahead.
CAPCOM Casper, Houston. Go ahead.
CAPCOM Casper, Houston. If you're transmitting you're way down in the mud. I can't read you.
SC Can you read now Hank?
CAPCOM Okay. Much better now Ken.
SC With the - - I say - - I got a film status report for you. And I'd like to ask you a question about the optics. I'd like to stow the optics instead of leaving them up, unless the temperatures are going to get to high. And the reason for this is that every time we run around pass the sun it's like thowing thru on a spot light inside.
CAPCOM Roger. Stand by.

END OF TAPE

CAPCOM Okay, Ken, go ahead with your film status and we're looking at that stowing the optics.

SC Okay, the magazine 00 reads 26, magazine November November is either 33 or 34 depending on how you look at it.

SC We finished up the 16 millimeter mag on Alpha Alpha by taking spectors of the - part of the LM paint that we think is shredding. Magazine Oscar and November have been used just for the targeted pictures - no extras. And I guess that's - we didn't take any other original pictures today except for the AA frames on the LM. Tomorrow we'll try to get some interior photography.

CAPCOM Okay. Copy 26 frames on Oscar Oscar. The November November report we got last night was 33 frames. You didn't use any of it today?

SC No. Just for that UV. So whatever it was last night, it must be one more.

CAPCOM Okay. 34. And, Ken, it's okay to stow the optics.

SC Okay, Henry, thank you. And I'd like to go ahead and take the voice com down before I turn the optics power off. I want to try and take on last look and see if I can pick up one of the planets as we turn around and I'd like to go ahead and knock off the voice.

CAPCOM Okay, Ken, get the voice down and have a good night.

SC Okay, Henry. See you in the morning. Good night to you.

SC Houston, Casper.

CAPCOM Okay, Casper, go ahead.

SC Okay, I'm not sure what just happened. I just saw - down looking at the optics and all of a sudden I saw a warning light and I got a no attitude and a gimbal lock light, and my ball seems to, in fact - it looks like the platform may be frozen, although we're still in PTC here.

CAPCOM Okay, we're seeing some telemetry. We saw something about the time you come on the line there.

SC It shows the CDU's down 20. It's must be in gimbal lock.

CAPCOM Stand by a little bit, Ken. We're taking a look at the telemetry.

PAO This is Apollo Control at 38 hours 22 minutes. That was Ken Mattingly reporting what appears to be a problem in the Guidance and Navigation System on the Command Module. His voice report came almost simultaneous with a warning light on the Guidance Officer's console and reports from the Guidance Officer to the Flight Director, Phil Schaffer, here in the Control Center. Mattingly's

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description of the problem was that they had a warning light in the Command Module indicating no attitude. The gimbal platform frozen - we have an indication here of gimbal lock and course align and we're looking at that data right now to try to determine what it might mean.

END OF TAPE

CAPCOM Ken, just so can make sure we got it straight down here, could you run through again what you were doing, and then the sequence of events?

SC Okay, Hank, I'm not real sure when it happened, I was trying to see if I couldn't pick up one of the planets in the optics and I was using P52 and I had gone in and I was calling option 3 and then putting in plan vectors out of the flight plan and I tried - I thought I was going to catch, I guess it was (garble). And it looked like I had just missed it and I was driving around just kind of looking around to see what I could see in the sky and waiting and trying to pick up Jupiter. And somewhere in there I guess I came down to zero the optics or do something and I looked down and saw I had a PGNC light and I guess I had just recently - I guess I was about ready to give up on it and call P00 and I think I had, in fact I think I called P00 at or just before the time I - we ended up with the gimbal lock and the no attitude. Then it was just a couple seconds or so I guess before I called you about it, maybe 15 seconds or so.

CAPCOM Okay, you got gimbal lock -

SC I can't think of any combination of DSKY inputs -

SC I was trying to think if I could have made some combination of DSKY inputs that might of - had I gotten in almost the right inputs that I could have caused the problem but I don't see where using any verbs or nouns could have done this.

CAPCOM Okay, you've got a gimbal lock and no at. Did you get an ISS warning?

SC No sir, I did not.

CAPCOM No guidance.

SC And the noun twenties were approximately correct for both pitch and roll, although the middle gimbal angle was completely out to lunch.

SC Houston, Casper.

CAPCOM Go ahead Ken.

SC I'd like for you to think about the effects of having me go ahead and do a verb 41, noun 20 to match up with the SCS. That thing's been drifting a good bit, but in any case, maybe I can get it close enough to have a starting point to try and pick up some things. I had been looking in the telescope just before this all happened and there's so much of these little particles out there that chances of recognizing a star pattern are extremely dubious. I'd like to try anyway, maybe we can work on something like the Earth, maybe the Sun, or something like that.

CAPCOM (garble).

CAPCOM Okay, stand by.

SC Okay.

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CAPCOM Do you want to stand by on this verb 41,
noun 20 until you get your gimbal lock removed?

SPEAKER Okay, CAPCOM tell him we're working up.
Thank you.

END OF TAPE

CAPCOM Casper, Houston. We'd like you to hold up on the VERB 41 NOUN 20. We're working on procedures to try to get rid of the gimble lock.

SC Okay. Did you have any data coming down at the time this all happened or were you in the blind?

CAPCOM Roger. We had good high bit rate data and they're pouring over that now.

SC Okay. I'll sit tight then. Thank you.

CAPCOM Casper, Houston.

SC Go Ahead.

CAPCOM Okay. We want to try to get the platform inertial again and what we'd like for you to do is a VERB 23 NOUN 20 enter-enter VERB 40 enter.

SC VERB 23 NOUN 20, enter. Then you want me to put plus enter into that register. Okay, I got rid of the gimble lock light. Now you'd like me to do a VERB 41?

CAPCOM VERB 40 enter.

SC Okay. VERB 40, enter.

CAPCOM Okay. Our data shows the platform is inertial now Ken.

SC Rog. And that appears that way from here to.

CAPCOM Okay. Ken, you can go ahead now with your VERB 41 NOUN 20.

SC Okay. This will be a course in line to the GDCX. Is that correct?

CAPCOM That's affirm.

CAPCOM Ken, hold up on that VERB 41 just a second.

SC (garble)

SC I'll go ahead and load it but won't enter.

CAPCOM Okay. The guidance has got a little thing their looking at talking to people in the back room. Little discussion going on here.

SC Okay. I won't do a thing. Thank you.

PAO This is Apollo Control Houston at 38 hours 40 minutes ground elapsed time. What you've been listening to is command module pilot Ken Mattingly talking back and forth with Mission Control. We had an earlier indication that the IMU platform appeared to be in a gimbal lock. Mission - -

SC Houston, are the GDC ball and the IMU ball completely out of sight?

CAPCOM Al, actually their not that far out. Their like 10 degrees in outer gimbal and let's see the - - the little gimbal is off by about 2 degrees, the inner gimbal no more than 3. Lot's closer to 2 degrees.

CAPCOM Roger. That's - -

SC (garble) we're close.

PAO Mission Control has been going through a

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PAO series of procedures with Ken Mattingly to alleviate the gimbal lock - - lock situation. Presently the platform is inertial. We'll stand by as series of VERBS and NOUNS have been passed up to the spacecraft Casper. We're at 38 hours 42 minutes ground elapsed time. Apollo 16 now 138 786 nautical miles away from Earth. This is Apollo Control Houston.

END OF TAPE

CAPCOM Casper, Houston.
SC Go ahead.
CAPCOM Okay, I think that the agreed on procedure here - is to go ahead with the Verb 41 Noun 20. That's procedure - in the G&C checkiist - 7-1. And reset the REFSMMAT - REFSMMAT flag and pass on through that.
SC Okay. I guess, based on our drifts, I'm not sure that's any better, but I guess that's no worse, so I'll just go to that one, then.
CAPCOM Okay. 7-1.
SC Okay. That's page 7, past 1. I understand.
PAO This is Apollo Control, Houston, at 38 hours 54 minutes ground elapsed time. Command Module Pilot Ken Mattingly now going through a series of Verbs and Nouns, trying to align the IMU platform to the gyro display coupler. We presently show Apollo 16 at a distance of 139,243 nautical miles away from the Earth. Continuing to monitor, this is Apollo Control, Houston.
SC Hank, it's not clear, I won't be able to find any stars with no closer alignment than I have on this thing. Looks like I'm going to have to get a coarser alignment by using some big objects like Earth or something like that.
CAPCOM Okay, are those particles out there giving you a lot of trouble?
SC That's all there is. They're just everywhere. When you combine them with the limited area that you have to look in because of the LM reflections, you find the telescope to be very unsatisfying.
CAPCOM Casper, Houston. Why don't you go ahead and try them with the Sun and the Moon? You've got a filter for the Sun, right?
SC That's affirmative.
PAO This is Apollo Control, Houston, at 38 hours 59 minutes ground elapsed time. That was Ken Mattingly reporting difficulty sighting stars through the optics - those desired stars for alignment - because of the vast number of particles. The update from CAPCOM Hank Hartsfield indicated a go-ahead to try the alignment using the larger objects - in this case, the Sun and the Moon - for alignment. We show Casper's onboard computer program in Program 52 - this is a platform alignment program - as Command Module Pilot Ken Mattingly presses on with his procedures. Apollo 16 is now 139,452 nautical miles away from the Earth, and this is Apollo Control, Houston.

END OF TAPE

APOLLO 16 MISSION COMMENTARY, 02:54 CST, 38:59 GET, 4/18/72, MC-132

PAO Apollo 16 is now 139 452 nautical miles
away from the Earth and this is Apollo Control Houston.

PAO Apollo Control, Houston. 39 hours 3 minutes
ground elapsed time. Guidance reports that command module
pilot to Ken Mattingly is half way through his platform aline-
ment. He has performed his mark on the sun and he is now
proceeding with his mark on the moon. We're at 39 hours
4 minutes continuing to monitor. This is Apollo Control,
Houston.

SC Houston, Casper.

CAPCOM Go ahead.

SC Okay. I used the earth and the sun and I
got four balls 7, which I think is going to be a significant
improvement. I'd like to go ahead and see what those torquing
angles turn out to be.

CAPCOM Roger. We concur.

SC Okay. That looks about right for the
amount that I had to correct for it. It's kind of hard to
mark on the earth because you have to guess where the terminator
really ought to be.

SC Do you have those torquing angles?

CAPCOM Roger, Ken. Go ahead and torwue.

END OF TAPE

PAO This is Apollo Control Houston, 39 hours 9 minutes ground elapsed time. We now show Apollo 16 at 139,788 nautical miles away from Earth. Command module Ken Mattingly in using the Earth and Sun for platform alignment through the optics reports significant improvement over his earlier attempt in the star sighting. We'll continue to monitor conversations between command module pilot Ken Mattingly and CAPCOM Hank Hartsfield here in Mission Control.

SC Okay Henry if you have those angles, I'll torque these.

CAPCOM Ken, what was your NOUN 05?

SC 4 balls 1.

CAPCOM Roger.

SC OK, I'll torque these on the minute one one.

CAPCOM Okay, clear to torque.

PAO This is Apollo Control Houston at 39 hours 11 minutes, Mattingly doing a second P52 platform alignment this time using 2 stars for sighting and in this way the fine tuning -- his earlier improvement if possible with the Sun in -- Moon -- Earth and Sun as reference. We're at 39 hours 12 minutes ground elapsed time and we now show Apollo 16 at an altitude of 139,907 nautical miles away from the Earth.

SC Okay, looks like we are pretty much on target now and I don't see any reason to torque these again, unless you particularly want to.

CAPCOM Okay, we concur Ken, don't torque those and we want to check a few switches. They're working on now getting a switch check list and then we're going to let you get some rest and smoke the Beta over during the night and have a score for you in the morning.

SC Okay, can you give me any -- can you give me any cursory ideas of that just the same, if there's any possibility I entered something inadvertently. Or does it take too long to sort all that out?

CAPCOM Okay, the preliminary look here we think it's a hardware problem Ken. Some sort of a transit problem and when we get the data in here we'll be able to tell a little more about it.

SC Okay. Guess I'm sorry to hear that.

CAPCOM They don't think at this point that it's anything that you did and it appears to be a transit problem but we won't know till we take a look at it.

SC Okay. Let me give you one other little tidbit that now seems to be somewhat more of interest than it was before and that's that -- when I take this optics zero to zero the area around the shaft P pack makes a lot of -- a lot

SC more noise than the one (garble). It seems to me that's it's making more noise now than it used to. When I say used to, when we first started out. When we first started out they were very very quiet and you couldn't even hear them running and now they're getting noisier -- that may be typical but it's just one more thing that -- I guess we'll throw out all these things -- I'll try to minimize them number the times I zero the optics, at least with the zero switch. I'll use manual wherever possible.

CAPCOM Okay, that only occurs when your zeroing?

SC That's perfect. Well actually Hank, I just tried in a manual and it occurs when the noise occurs and whenever I'm in a extremely high rate.

END OF TAPE

SC Well, actually Hank, I just tried it in manual it occurs when the noise occurs and whenever I'm in an extremely high rate, you know like using high in a max shaft rate.

CAPCOM Roger, copy.

CAPCOM Okay, Ken, we would like to check some switches up on panel 1.

SC Stand by, sir.

SC Okay, go ahead, Hank.

CAPCOM Okay, we'd like to check position in FDAI scale.

SC The scale is in 51.

CAPCOM Okay, select.

SC Select is in 1 amp, the source is in attitude set, and the attitude set is in GDC.

CAPCOM Okay, that's what we wanted to know, thank you.

SC Okay, and I think I'll go ahead and get some sleep then. Getting (garble) yet?

CAPCOM Okay, stand by and let me check.

CAPCOM Okay, Ken we have everything out. (garble)

CAPCOM Casper, Houston.

SC Go ahead.

CAPCOM Okay, you caught us on the antenna switch. We don't have anything else for you. We'll look at the data over and get the word up to you tomorrow. It looks like to us now that you can get a full 8 hours sleep.

SC Okay, thank you.

CAPCOM See you tomorrow.

SC Okay, Hank. How about making the dollar shift.

CAPCOM Rog.

END OF TAPE

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DEAD AIR

END OF TAPE

SPEAKER Honeysuckle COMTECH, Houston COMTECH.
Net 1.
SPEAKER Honeysuckle, loud and clear.
SPEAKER Roger. You the same. Thank you.
SPEAKER Roger.
SPEAKER (Garble.)
PAO This is Apollo Control, Houston, at
39 hours 30 minutes ground elapsed time. We presently show
Apollo 16 at a distance of 140,597 nautical miles away from
the Earth. As you heard, Ken Mattingly has now been given
the go ahead to start his sleep period. This being the
case, we will go over and recount the activities that have
just taken place regarding the Guidance and Navigation
System. It - this activity was spurred when Mattingly
saw a gimbal lock warning light onboard and a no attitude
light onboard. This was verified by the Mission Control
Team here on the ground. The first step taken the IMU was
coarse aligned to the Spacecraft body. When this occurred,
this alignment wiped out the roll attitude in reference.
The first step, Mattingly was given the go ahead to unlock
the platform with ground procedures, and this allowed the
platform to go inertial. Initially, he tried to align
the platform with stars. He was unsuccessful with the
platform alignment with stars and this - primarily because
of the debris around the Spacecraft. As the next step,
he then used the Sun and Moon to align the platform and
was very successful in this effort. Then the platform was
tweaked in its alignment using the stars; and this was
possible because the platform alignment with the initial
planet reference was good enough to use the AUTO Optics.
Here in Mission Control during this shift, we will be
playing the recorded data, and this will be evaluated over
the course of the shift. Initially, it appears to be a
transient problem. We're at 39 hours 33 minutes ground
elapsed time. We show Apollo 16 140,686 nautical miles
away from the Earth. Velocity now 3854 feet per second,
and this is Apollo Control, Houston.

END OF TAPE

PAO This is Apollo Control Houston at 40 hours 35 minutes ground elapsed time. We presently show Apollo 16 at an altitude of 142,978 nautical miles, this from Earth and traveling at a speed of 3779 feet per second. The crew is now sleeping after a flurry of activity related to a - the guidance and navigation system. Ken Mattingly, it appears, went to sleep at 40 hours GET, dozed off to sleep. At an earlier time 38 hours 22 minutes GET the command module had a gimbal lock warning and a no attitude light onboard. This was verified by the flight controllers here in the mission control center. The inertial measuring unit had been coarse aligned to the spacecraft body when this problem developed. It wiped out the roll attitude reference. As the first step, Ken Mattingly, command module pilot unlocked the platform with ground procedures allowing the platform to go inertial. A first attempt by Ken Mattingly to align the platform using stars was unsuccessful because of the debris around the spacecraft. He then used the sun and Moon as references to align the platform and this attempt was very successful. As a follow on step, Mattingly then tweaked the alignment of the platform with the stars. He was successful in this second attempt because the platform at this time was good enough to use the auto optics. There has been very little conversation over the flight control loop here in the mission control center for the past 30 to 40 minutes. During this shift the recorded data is being replayed for a continuing evaluation. At present it appears that what we have seen is a transient problem to the guidance and navigation system. It should be emphasized Ken Mattingly did successfully realign the inertial platform before getting the go ahead to start his sleep period. A confirmed failure, of the IMU would give a no go for LOI, however at this time the guidance and navigation platform is completely stable and the ground control team here in mission control is satisfied. We're at 48 hours 38 - 40 hours 38 minutes ground elapsed time, we will at this point take down the air to ground loop because we expect no further conversation with the crew. This is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control Houston at 42 hours 30 minutes since liftoff. We presently show Apollo 16 at a distance of 147,092 nautical miles away from the Earth, velocity now shows 360,065 feet per second. We've had no conversation with the crew of Apollo 16 over the past hour. There are some 5 minutes remaining on the sleep period. We're at 42 hours and 30 minutes ground elapsed time and this is Apollo Control Houston.

PAO This is Apollo Control Houston at 42 hours 32 minutes ground elapsed time. We have a correction to our last report. A sleepy commentator reported 5 minutes remaining on the sleep period of the Apollo 16 crew, that should have been stated 5 hours remaining. I repeat, 5 hours remaining of crew sleep. We're at 42 hours 32 minutes into the mission and this is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control Houston at 43 hours 30 minutes into the flight of Apollo 16. We now show the Apollo 16 spacecraft at a distance of 149 191 nautical miles away from the earth and now traveling at a speed of 3608 feet per second. At the present time, the crew of Apollo 16 is asleep. Also, at the present time, the Mission Control Center here in Houston is receiving periodic data from the Apollo 16 spacecraft due to an inability to switch antennas by ground command. At present, here in Mission Control, we're receiving 11 minutes of data, and 7-1/2 minutes of data dropout. This will become a troubleshooting exercise with the crew after the crew awakens. The ENKO flight controller has tried through the Madrid and Carnarvon stations, but thusfar, has not been able to get in commands to switch antennas. This inability in antenna switching from the ground is why we're receiving the periodic data. The crew will remain in their sleep period for 4 more hours. At 43 hours 32 minutes ground elapsed time, this is Apollo Control Houston.

END OF TAPE

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PAO This is Apollo Control, Houston, at 44 hours 30 minutes into the mission. Now we presently show Apollo 16 at a distance of 151 216 nautical miles away from the earth. Velocity now reads 5353 feet per second. Flight Director Phil Shaffer has decided to update the crew wakeup time by 1 hour. This being 1 hour earlier because of the work day. This 1 hour will allow spare time for troubleshooting associated with the antenna switching. There will be a change of shift briefing at 9:30 AM in the News Center Briefing Room. Participants will include Flight Director Phil Shaffer and Guidance and Flight Controller Gary Coen. The Gold Team of flight controllers headed by Flight Director Gerry Griffin is scheduled to take over at 46 hours ground elapsed time. At the present time, we show 1 hour 59 minutes from time of crew wakeup. At 44 hours 31 minutes, this is Apollo Control, Houston.

END OF TAPE

PAO This is Apollo Control. 46 hours 1 minute ground elapsed time, and about 30 minutes early, the, or ahead of the scheduled wakeup time, the crew has called Mission Control. We have a few seconds of accumulated tape caught unawares. Then we will rejoin the conversation with the crew of Apollo 16 live. Let's roll the tape.

SC This is Apollo 16, just fine.

SC Houston, how do you read Apollo 16, over?

CAPCOM 16, your loud and clear. How me?

SC I read you the same. Good morning to you.

CAPCOM How are you doing this morning?

SC Doing great. I guess that sort of depends on what you can say about the old platform.

CAPCOM Roger. Okay, 16, the gimbal lock and the course line that you had back at 38 plus 18, was caused by a CDU transient in the YAW axes. The transient was induced when the TVC relay was disabled. Relay is normally inabled when the OPTICS is in manual and disabled when you select P00, and that's the kind of situation you are in when that occurred and Ken had just selected P00 and he had prior to that been using the OPTICS manual. And they say that this type transient has been observed in CSM 117 testing, and we're presently looking at a soft way of work around for LOI and we'll get some more words to you later on this, on this same schedule.

SC Now your talking. That's the best news I've heard today. So far.

CAPCOM Okay, and John, we've had some problems here getting commands up to the bird, real time commands. And we've got a command cancell we want to run. And we'll be standing by as soon as you can get it ready let us know and we'll get into.

SC Okay. We've got seat flops to do and we'll let you know.

CAPCOM Roger.

CAPCOM 16, in a situation we're in now, we've only got 1 OMNI we can read and we can't command. So we're only getting about 11 minutes of low bit rate data out of every 18 while you are in PTC. It's possible that we might loose you, if so just stand by and we'll pick you up again.

SC Okay. We're ready for that command test, Pete.

CAPCOM Okay.

CAPCOM Okay, Charlie. We're going to go 1 step at a time. First thing we want to do is up telemetry command reset and then normal.

SC Okay, you want a command reset in normal?

CAPCOM Charlie, we want the up telemetry switch to reset and then normal.

SC Roger, it's reset normal.

CAPCOM Okay, Charlie. Stand by we're going to try some commands.

CAPCOM Okay, Charlie. That apparently didn't work. We're going on in that we want to cycle the up telemetry switch OFF for three seconds, and then back to normal.

SC Roger. It worked.

CAPCOM Relay is normally inable when the OPTICS is in manual and disabled when you select POO. And that's kind of the situation that you were in when that occured and Ken had just selected POO and and he had prior to that been using the OPTICS - We may have to put him up there anyway Charlie.

SC Give me the updates, Phil.

CAPCOM 16, Houston. I've got about 3, a couple of 3 updates to the flight plan when ever your, it's convenient for you, we'll read them up.

END OF TAPE

CAPCOM Okay, Charlie. That apparently didn't work. We're going on in that we want to cycle the up telemetry switch OFF for three seconds, and then back to normal.

SC Roger. It worked.

SC Okay, your back to normal.

CAPCOM Okay, we're trying commands now, Charlie, stand by. Okay, Charlie, that apparently cleared it up.

SC Okay.

CAPCOM And, Charlie, we've got commands again and we'll handle the antenna and the bitrate for you now.

SC Okay, fine.

CAPCOM To repeat an old phrase, Charlie, we had a lot of people down here turning blue on this flight till that last little situation got cured there.

SC Was that, that IMU problems?

CAPCOM No the comm problems.

SC Well you could put Fendell in the back up Mode. You could put him up on top of the building.

CAPCOM We may have to put him up there any way, Charlie.

SC (laughter) afraid so.

CAPCOM Relay is normally inable when the OPTICS is in manual and disabled when you select P00. And that's the kind of situation that you were in when that occured and Ken had just selected P00 and and he had prior to that been using the OPTICS -- We may have to put him up there any Charlie.

SC Give me the updates, Phil.

CAPCOM 16, Houston. I've got about 3, a couple of 3 updates to the flight plan when ever you're, it's convenient for you, we'll read them up.

END OF TAPE

SC Don, you about ready for a little
status report?
CAPCOM Stand by a minute, Ken.
CAPCOM Okay, Ken. We're all set. Go ahead.
CAPCOM Okay, Ken. We're all set.
SC (garble)
CAPCOM Casper, Houston. How do you read me?
CAPCOM Casper, Houston. How do you read?
CAPCOM Casper, Houston. How do you read me?
CAPCOM Casper, Houston. Do you read?
SC (garble)
SC Houston, Casper.
CAPCOM Casper, we read you loud and clear. You
read me?
CAPCOM Casper, Houston. How do you read?
SC Houston, Casper. Over.
CAPCOM Casper, we read you. Do you read us?
SC Houston, if you're reading Casper, we're
transmitting you (garble). We have signal strength of a
leader of about 60 percent, we're not receiving you, and
based on your comment about the antennas we'll wait about
5 minutes and then try again before you change the configuration.
CAPCOM 16, you're loud and clear. Do you read
Houston?
CAPCOM Casper, Houston.
SC Roger. We lost you there for awhile,
Don.
CAPCOM Roger. You're loud and clear now. Do
you read me okay?
SC Loud and clear.
CAPCOM Roger. You were loud and clear all the
time. Apparently, you just lost us.
CAPCOM 16, the comm problem may have been on
the ground. We'll try to find out and let you know in a
minute.
SC Roger.
SC The background tone at the - the back-
ground noise that the system is making right now is a
little different then it was making before if that would
help you any to figure out what the problem was. It's
almost like it wasn't uplinking, maybe.
CAPCOM Roger, 16.

END OF TAPE

SC The background told at the -- the background noise that the system is making right now is a little different than it was making before. They'll help you figure out what the problem was. It's almost like you weren't uplinking maybe.

CAPCOM Roger, 16.

SC Okay Don, if you're ready I'll give you some status reports.

CAPCOM Stand by just a minute, Ken. Okay Casper, go ahead with your status report.

SC Okay. I'm using that famous old trick on how to get someone to talk to you, but every time I pick up a juice bag and get half way down, why it seems like we are able to establish com. So I'll start with the Commander's list and I'll go through and I'll skip the menus since they are on separate pages and I'll come back to them. So let's start with A-1 22035, alpha 3, 7 good, alpha 4, none, alpha 5, 191518, alpha 6, 656 N3, that's a total of 4. Going to Bravo. Bravo 1 15035, 6 good, that's on Bravo 3. Bravo 4, none, Bravo 5, 103025, Bravo 6, 22 N5. Charlie 1, 21059, Charlie 3, 7 good, Charlie 4, none, Charlie 5, 1530, Charlie 6, 77555. Okay, and if you want the menu stuff, I'll go back to that now.

CAPCOM Okay, go ahead.

SC Okay. For John, and that's for day two meal B. So scratch the bread and peanut butter. On meal C, scratch the frankfurters, add an orange drink. Okay, on Bravo 2. Are you still there, Don?

CAPCOM Affirmative, we're getting a lot of background noise.

CAPCOM 16, hold off a minute we'll switch on receiver -- hold off a minute 16, we'll switch OMNI's.

CAPCOM Okay Casper, go ahead.

SC We're not getting your signal. Okay, starting on -- where did you copy last?

CAPCOM Okay, we got John, day two, B0 Charlie complete and we're ready, I guess, for Bravo.

SC Okay. Bravo 2, on meal A you can scratch sausage patties and orange juice and fruit cocktail. On Bravo, that's meal B, you can scratch turkey and gravy, vanilla pudding, bread, peanut butter. On meal C, you can scratch the chocolate pudding. Going to Charlie 2.

CAPCOM Okay.

SC On meal A, scratch the sausage patties. Meal B, you can scratch the bread and peanut butter. Meal C, you can delete two of the frankfurters and scratch the chocolate pudding.

CAPCOM Okay Casper, we copied all that.

SC Okay, and a couple of other words here on the -- we've got ALFMED coming up and to date Charlie saw some flashes the other night. And, not a whole heck of a lot of them last night. And I'm not sure I have seen any at all yet, and John may or may not. So what we'd thought we'd do here is -- we've got a little more house cleaning to do here and finish our chores. And we'll probably take a look at what we see and if Charlie is seeing sufficient -- enough flashes that he is pretty sure he's seeing things, why we'll go ahead and run the experiment now. And if we aren't seeing a sufficient number that looks like it justifies sitting here for an hour with it, why won't you think about saving it until such time as it looks like maybe we see more of them?

CAPCOM Okay, Ken, we'll think on that a little. And also, I've got a note on the Nikon camera light meter here in connection with the ALFMED photography.

SC Okay stand by another second.

END OF TAPE

CAPCOM Ken you don't really need to copy much I think because you've got the camera head in there where you can look at it. I can give it to you in a few words.

SC You know one of the things that we need in this program is some octupuses.

CAPCOM Rog.

SC Okay, Don, I don't have the camera but how about just reading to me whatever it is you wanted to say and I'll write it down here.

CAPCOM Okay. It's probably not worth writing down except a little note to remind you the camera was observed to hang up in the battery check position full down. When you hit the camera light meter on, check, and what we want you to do is the little button on top of the camera there has a white band around the base of it, they want to make sure that white line is visible on the light meter switch button. If it is not visible you can take your fingernail and catch the top of that button and pull out on it until the white line is visible, and then verify that the meter is operating by holding the camera up to a light and observing the meter response to burning light levels.

SC Rog. We'll make sure it works before we use it.

CAPCOM Okay, Ken. That's all I've got on that one.

SC Houston, 16.

CAPCOM Go ahead 16.

SC Rog. Flash with a hot report here. Pass on to the chefs that the grits were delicious.

CAPCOM Say again, Charlie. I didn't copy that.

SC I said pass on to the chefs that the grits were delicious.

CAPCOM Roger, will do. And for Ken's information the status report that we'd just gotten was excellent as far as format and readability and everything. Doc said he really appreciates it.

SC Always playing the helper.

END OF TAPE

PAO This is Apollo Control. 47 hours and 27 minute into the mission of Apollo 16. Crew awake now. Presumably conducting either the ALFMED experiment or beyond the eat period. As a matter of fact, part of their first activities after wakeup, was the status report, which all the parts not eaten, in other words, negative reporting on the meals for the three crewmen are read down. Also the problems with the commanding through the OMNI antennas have cleared themselves up, with the crew cycling a switch OFF to back ON again, which cleared the logic in the switching circuit. And everything is properly working now in that area. As soon as the crew completes the current housekeeping activities, the trouble shooting procedures for the inertial measuring unit and the Guidance and Control System, Guidance and Navigation System will be read up to the crew, and they'll persue that problem. As a little aside to the crew food report, Charlie Duke, a good southern boy from South Carolina, said "pass on to the chef that the grits were delicious". Grits having been packed in the menu on his request. Present distance of Apollo 16, 157,253 nautical miles out from earth. Velocity ever decreasing as we near the cross over point. Now 3,396 feet per second. Total spacecraft weight still 102,890 pounds. We're continuing to leave the circuit live by ground noise and all, as we anticipate resumption of communications between spacecraft communicator Don Peterson, and the crew of Apollo 16, for the day's activities. This is Apollo Control at 47:30.

SC Houston, 16, over.

CAPCOM Go ahead.

SC Okay, Pete, I'm up on BIO-MED. How does it look?

CAPCOM Stand by one.

CAPCOM Okay, the BIO-MED data looks good.

SC Okay, thank you.

SC You can tell Charly's still breathing, uh.

CAPCOM It looks that way.

SC We've been suspecting it up here all along.

CAPCOM Rog.

SC Houston, based on the burn yesterday, is the data you gave us for the SPS burn card still going to hold for LOI?

CAPCOM Stand by a minute.

SC And the other question is, does it look like we're going to have another midcourse and which one and how much is it.

CAPCOM Okay, we'll get back to you in a minute.

SC Okay, thank you, Pete.

CAPCOM Okay, 16, on the burn card, we will probably have to do some more updating. We'll get to that tomorrow, and on the midcourses, the midcourse 4 right now looks like it's less

CAPCOM than 1 foot per second. If it get's much bigger, we'll probably do it. But we'll advise you.

SC Houston, 16. Your breaking up badly. How do you read us, over?

SC (garble)

SC Okay, Houston, (garbled) on the burn card.

CAPCOM Okay, 16. If you read, we probably will have to do some updating on that, on that pad, and we'll let you know on that. We'll update it tomorrow. And on the midcourse 4, midcourse 4 is looking pretty small. Less than 1 foot per second now. If it gets larger, we'll probably go ahead and do it, but we'll keep you advised on that.

SC Houston, you uplink keeps fading in and out on you.

CAPCOM Roger, 16. We're switching on that.

SC You're fading then.

SC Houston, 16 -

END OF TAPE

SC Houston, 16. Do you read us now?
CAPCOM I read you loud and clear. Do you read me?
SC Read you same. You faded out on your last transmission again.
CAPCOM Okay, hang on a minute till the comm clears up a little bit and then I'll come back to you.
SC Okay.
CAPCOM Okay, 16. Let's try it again. On that updating the pad, we'll get that to you tomorrow. And right now midcourse 4 looks very small, less than 1 foot per second. If it gets larger, we will probably do it, but we'll keep you advised on that.
SC Outstanding.
SC Just to review that SPS pressure system, as near as I can make out, it's purely - we don't actually have a Delta-P. It's just - of about more than 5 psi, what we do have is a gauge difference. Is that not correct?
CAPCOM That's affirmative, John. There's a chamber in there - a reference chamber that's supposed to be at atmospheric pressure. It is apparently vented to a vacuum condition, which brings in about about a 14.7 psi bias. Then there's a 5 psi meter bias on top of that.
SC Okay, so actually, the two meters as we look at them now are actually balanced. Is that not correct?
CAPCOM I believe that's correct.
SC Okay.
CAPCOM John, the actual pressures on both meters - the actual pressures are the same, although the meters they're reading differently.
SC Okay, we got the message.
SC Houston, 16. Will we need to charge battery B? Just looking ahead in the flight plan a little bit.
CAPCOM Just a moment.
CAPCOM Okay, Charlie. You can go ahead and start charging the battery now.
SC Rog.
SC Okay, Pete, Bat B is on charge now.
CAPCOM Understand. Bat B on charge.

END OF TAPE

SC Houston, 16.
CAPCOM Go ahead 16.
SC Okay, Pete. We got you. Finally had time to look out the window and you are just coming into view again. Just as pretty as ever.
CAPCOM Very nice. What you looking at right now?
CAPCOM Can you tell what part of the earth?
SC I've got a half earth. Say again!
CAPCOM Can you tell what part of the earth you're looking at?
SC Well, we've got half earth and we see a land mass, we see the North Pole. The North Polar cap with two big swirls coming off of it to the southwest. I can see the subsolar point very distinctly. It is a big white dot in the center towards the LM, away from the terminator and there is a big land mass that is visible in the center and can't really make out exactly what it is. It's clear clouds though. It's the only place that's fairly clear.
CAPCOM Okay, we show you directly over North Africa. Yeah that's just about the terminator.
SC Okay, you've got North Africa at the terminator?
CAPCOM Just about.
SC Okay, that's what it is, and looking at it, yeah. It's Africa. Looks like a good storm system up in the Atlantic Ocean and above the subsolar point.
CAPCOM Roger.
SC The blue coloring - the white of the clouds and the blue of the Ocean, Dick. Things just stayed pretty constant as we moved out it is still a spectacular sight.
SC Houston, 16. Over.
CAPCOM Go ahead, 16.
SC What do they think of this PTC down there in the trenches?
CAPCOM This is looking real good.
SC It really does look good. I don't know who to congratulate, Ken or the computer?
CAPCOM I guess we'll give Ken credit for that one.
SC You're darn right.
CAPCOM 16, let us know what you think about the number of light flashes and whether or not it is feasible to try the ALFMED.
SC Okay. It's in work right now.
CAPCOM Roger.
SC That is, if you can work on (garble).
CAPCOM Right.
SC That's a low belt bolide load.
CAPCOM (garble) I understand.

END OF TAPE

SC Okay, Houston, we're going to start on the update now, and I guess it it'll take us about an hour and a half from the time we start to the time we finish up.

CAPCOM Okay, and do you think you are seeing enough light flashes to make it valid?

SC They haven't gotten around to doing yet, but we're working on it.

CAPCOM We'll roger instead.

SC Don, Charlie saw some this morning when he got up and so we're going to put the ALFMED on Charlie and we will not turn it on until we start seeing flashes and if we don't see any, we'll just terminate it. We'll wait till some reasonable time and we'll talk it over with you. We'll tell you when we're ready to go through it. That's our present plan.

CAPCOM Okay, Ken, we'll be standing by. And, Ken, while I'm talking to you, we've got a little more information on this platform problem and it's a fairly big mouthful, so, sometime when you get a chance when you can copy some information, give me a call.

SC Okay, it looks like it will be a while.

CAPCOM Roger. We don't want you to get into another P52 before we have time to talk about it.

SC All righty. Pete, a little background on these light flashes --

CAPCOM 16, Houston, we missed your comments on the light flashes. You started to give them to us and you were blocked out by noise.

SC Roger, Pete. We're just telling you -- the first night during the first week or whatever that was GET, I saw numerous light flashes before going to sleep probably as quick -- as high as 3 or 4 minutes. The next morning, they were not as numerous as that and then last night still not as numerous. This morning, I was perhaps seeing maybe one every couple of minutes or so. If that frequency repeats itself during this test, is that good enough to go ahead?

CAPCOM Standby one, Charlie. Okay, Charlie. If you see one every minute or so, that's enough to go ahead.

SC Okay.

CAPCOM And 16, at 48:30 in the flight plan, there's a line that says synchronize mission time in the CMC clock and it is not required.

SC Okay, great. Thank you.

SC Hey, Don, is our comm going to be good enough the way we're going here now for you to get the marks or are we going to -- can we count on recording a mode 4 2.

CAPCOM You better record onboard as well.

SC Okay. You'll start the tape recorders.

SC Is that affirmative?

CAPCOM Affirmative. Call us when you're ready.

SC You want us to do that. Okay. We'll do that, thank you. Okay, if at any time, the voice quality goes down, our procedures, as I understand described, will -- I'll knock off or I'll take Charlie's place here and I'll knock off the observation and go to recording and other than that, Charlie will be doing all the things that I was going to be doing. But, if you want us to record the (garble) at the same time, just give us a call.

CAPCOM Roger.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/18/72 CST 12:30P GET 48:36 151/1

CAPCOM 16, Houston. Voice check.
SC Loud and clear there, Pete.
CAPCOM Roger. You all were so quiet you scared
us.
SC Okay Pete. I just got the ALFMED on,
and in position and we're going to see if we can see anything.
CAPCOM Okay.

END OF TAPE

SC Houston, 16.
CAPCOM Go ahead, 16.
SC Okay. I've seen 5 in 15 minutes.
CAPCOM 5 in 15 minutes, Charlie?
SC That's affirm.
CAPCOM Okay stand by a minute, we'll look
at that.
SC Okay, Don. We were just about ready to
call this thing off and try it another day and then it looked
like Charlie was starting to see them at a pretty fair rate.
That 5 for 15 minutes was like 4 in the last minute or two.
And John has seen one. I have not seen any yet. But sounds
like Charlie is going to be able to see these and I'm going
to go ahead and take the photographs and get all set and
wait for your answer.
CAPCOM Okay we've been advised that we do want to
go ahead with the ALFMED experiment.
SC Okay. It's at work. I'll tell you
when we're ready to start timing.
CAPCOM All righty.
SC Okay Pete, they seem to come in clusters.
You get 1 or 2 right after -- and then nothing for awhile.
CAPCOM Roger.

END OF TAPE

SC Hey, Don, can you help me (garble). (Heavy background noise.)

CAPCOM 16, that was so garbled we didn't copy could you commence to say it again?

SC Did you copy that, Don?

CAPCOM Negative, Ken. We were in - had a lot of that background noise and we didn't get any of that.

SC Houston, Casper.

CAPCOM Casper go ahead.

SC Did you copy comments about the film?

CAPCOM Negative we did not. We had too much background noise. Can you say again?

SC Okay, I guess I'll write it down. I think that's faster after all.

CAPCOM Okay.

SC Okay Houston, we're ready to start. Could you make sure the tape recorder is running?

CAPCOM All right, Ken, it's been running a while. We're going to rewind it and I'll get it back to you in a minute. In the meantime, Ken, if you've got comments, we'll take them on air to ground.

SC Does that mean you want us to go ahead and start?

CAPCOM Roger.

SC Say it over again. Was that roger or standby?

CAPCOM My comment is go ahead and start.

SC Okay, Don, we're running in 49:10.

CAPCOM Okay.

SC MARK. Okay, a bright dot in the - in my right eye in the upper left center.

CAPCOM Okay.

SC MARK. One dot in the left eye upper left bright center.

SC MARK, MARK. The first one was a fuzzy dot in the right eye. The left eye - the second one was a bright dot in the right eye, lower left center.

SC You copying Houston?

CAPCOM I told you we're copied. DSE is now running.

SC Okay. MARK light streak - white streak in the right eye upper center, moving from bottom to up - top. MARK faint left - faint white dot in the left eye - extreme left.

SC (Garble) that was a bright dot (HEAVY BACKGROUND NOISE).

END OF TAPE

SC Mark. (Garbled and heavy background noise.)
PAO This is Apollo Control. Apollo 16 crew
now conducting the Apollo light flash experiment, using the
blinders. The Apollo ALFMED, Apollo light flash in moving emulsion
detector, is the astronoms ALFMED. At 1:30 today, central standard
time in the small briefing room in the Apollo News Center MSC,
there will be a briefing by a panel of several scientist. The
topic is "Magnetic Enigmas of the Moon". Spacecraft distance
at the present time, 160,746 nautical miles. Velocity 3,307 feet
per second. At 49:17, still up live air-to-ground, this is
Apollo Control.

SC Mark, right eye center, just a bright flash.
SC Mark, a bright flash in the lower center of
the right eye.

SC Mark, little light dim streak in the lower
right eye, lower left.

SC Mark, lower left eye, in the out board and
it was a bright flash. Looked like a streak probably going from
right to left.

SC Mark, bright dot, upper right outboard,
right eye.

SPEAKER Hello. Hello. Hello. Hello. Hello.
(Crossup in communications. We have left out the spanish portion
of this tape.)

END OF TAPE

SC Mark dot -- bright dot in the upper right eye, center.

SC Okay, Houston, I've also added some very subtle things that are just very -- looks like little dim flashes that I haven't been calling. They're just so subtle, I've been afraid to call over a definite mark.

CAPCOM Okay, Charlie, we copied that.

SC Mark. Upper right eye going from left to right. Light flash.

CAPCOM Okay, Charlie, if you see anymore of the subtle marks, how about calling them and just call them a subtle mark. We'd like to record that information.

SC Okay.

PAO This is Apollo Control. The mysterious comments and singing and frequent repetition of hello, hello, on the Public Affairs broadcast line a few moments ago has been identified by the network controller as a telephone company technician in Spain who intervertantly somehow got patched over onto the network line coming from the tracking station on the air/ground circuit. He has been isolated electronically that is; and hopefully, we shouldn't have any more of that sort of thing. Continuing with the ALFMED experiment at 49:31.

SC Mark, right dot, right eye, center, upper.

SC (garble) Heavy background.

CAPCOM 16, you're very weak.

SC Mark, subtle 1, very subtle on the left eye, outboard upper.

SC Mark. Flashes on the lower right eye. Sort of a distant light flash.

SC Mark. Upper center of upper right eye (garble) by light flash.

END OF TAPE

SC Mark. Faint dot lower left eye inboard.
SC Mark. Flash, a light streak in the left eye starting at the center and going to the bottom right from upper -- from center down to right in movement.
SC Mark. Right side center right eye.
SC Mark. Left eye, sort of subtle, towards inboard center, a white flash.
SC Mark. Subtle dot -- white dot -- in the inboard center of the right eye. Mark again. That was the left eye. That was a center upper white, dot left eye, both of those were in the left eye.
SC Mark. Upper right -- part of right eye, light flash.
SC Mark. Subtle white flash, inboard upper right eye. Inboard corner, that was. Mark. Same spot. A white streak.
SC Mark. Right eye center, white dot.
SC Mark. White dot center -- center right lower of the left eye.
SC Same here. All of the same time Charlie did. Only mine were only in the lower left side (garble).
SC Mark flash across the bottom of the left, eye high speed.

END OF TAPE

SC Hey, Don. Can you tell us how we're
doing on time?
CAPCOM Standby, I'll let you know.
CAPCOM You've got about 10 more minutes.
SC Okay, thank you.
SC Don, this thing was made for about a
size 6-1/4 or something head. It's really tight on me.
CAPCOM Okay, John. We'll make a note of that.
SC I'm not complaining, it's just a little
tight.
CAPCOM Roger.
SC Mark. Lights flashing down to the right
there.
SC Mark. A dull fuzzy spot in the outboard
theater of the left eye.
SC Mark. Flash in the center of the left
eye (garble)
SC Mark. White dot, outboard, right eye,
center.
SC Mark. Small flash in the fore center
of the right eye.

END OF TAPE

SC Mark. Three tiny mites in the lower center left eye. Mark. Streak across the lower, left of the left eye, on the inward side. The light is going from left to right to left. Mark. Two little dots, flashes in the upper right center of the right eye, left eye.

SC Mark. Low flash in the upper right center of the -- (Garbled)

SC Mark. My last mark was an upper center right eye, low flash.

SC Mark, low flash in the (garble) -- right eye.

SC Mark. Mark. They were, the first one was right eye. A straight break from inboard center to the upper right. Left one was a streak, crystal shape, a pencil line. Left eye from center to upper right.

SC Mark. Very subtle flash in the light, right eye, upper right. Mark. Another subtle one just below that, center right, right eye.

SC Mark. Left eye, a streak starting in the center. Mark. Right eye, dot, center. The left eye was a streak starting in the center going out to the right. It increased in size as it went from right to left.

SC Mark. Subtle dot, outboard side, center left eye.

SC Mark. Mark. Faint dot in the right eye center upper, and the inboard side was a white dot in the left eye with the second one it was in the inboard side center.

SC Mark. Dot right eye, outboard center.

SC Mark. Streak in the lower left of left eye, and moving from top to bottom.

SC Mark. Simultaneous white dot. Right in left eye. Left one was in the upper right inboard center. Right one was in the inboard bottom left.

END OF TAPE

SC Mark. Dull flash in the right eye upper, inboard.

SC Houston, 16. How's the time?

CAPCOM 16, we figured the time is about up on the ALFMED experiment. We'd like to know if the motor is stopped.

SC No, it is still running.

SC MARK. A streak in the lower left side of the left eye moving down.

CAPCOM Okay, Ken. Keep going until the motor stops.

SC Okay. MARK thin white dot upper right, inboard left eye.

SC MARK. Lighting flash type phenomena lower right inboard left eye.

SC MARK. White dot center left eye. MARK. white dot, left eye, outboard, center.

CAPCOM MARK. White dot left eye center.

SC MARK. Right eye center inboard, a white dot.

CAPCOM Okay, Ken, we've got all the ALFMED data we need. We want you to give us a MARK when you shut the motor off.

SC Okay, Pete, MARK. ALFMED is off.

CAPCOM Roger.

CAPCOM 16, Houston. Whenever you can copy, I've got some words on the IMU problem that we had. Also some -- an entry to the GNC checklist.

SC Okay, Don. Standby until we clean up all this mess (garble).

CAPCOM Roger.

SC But you're cutting out pretty bad, Don.

CAPCOM Okay.

END OF TAPE

CAPCOM 16, the PI (garble) on the ALFMED experiment that we got about 70 counts and he's very happy with the results, and he wants you to verify that the clutch is in the stow position.

SC That's verified.

CAPCOM Roger, thank you.

SC Okay, great. Those things are really something, Don. There were a couple of the phenomena that I had seen previously that I didn't see today, but there were some other ones today that were different too. The phenomenon -- the flashes leave no afterglow and they're just instantaneous. All the colors are white, were all we saw. We saw no colors at all; neither John nor I. Everyone we saw was white.

SC Okay, Don, I'm ready to copy some things now.

CAPCOM (garble) Houston, before we get into copying stuff, could we confirm what Charlie said about that clutch. Now this might -- I think we tracked before and as soon as we went to the mid-position on the clutch, why, you can hear the plates come down. So, we went ahead and rapped it once, anyhow, just to be sure but I didn't hear anything jiggle and we cycled it to operate and then back to stow and it all felt normal and the plate travel sounded proper.

CAPCOM Okay, we copied that, Ken.

SC On the --

END OF TAPE

SC Okay, and I guess my only comment on ALFMED is that I think those light flashes are made by the same guy that makes the Emperors clothes.

CAPCOM That makes what?

SC I think they're made by the same guy that makes the Emperor's clothes.

CAPCOM Roger. Understand.

SC Hey Don, I'm standing by the copywriter - the words you got about P52's and G&N and any of those other subjects pertaining to our operation.

CAPCOM Okay, Ken. We'll talk about the platform problem first, and then back up and talk about the original data that we passed up because there are some small corrections to that. I'll try to break it down into about 4 shovel fulls here for you, cause it's a fairly big mouthfull if we try to do it all at once.

SC Okay. You've got some stuff that I probably should copy on.

CAPCOM Yes, I will have some items for you to copy.

CAPCOM Hold off a minute 16. We're coming up on an OMNI switch.

SC Roger.

CAPCOM Okay, 16. How do you read now?

SC Loud and clear.

CAPCOM Okay, we'll start here on this thing. First of all the problem occurs, apparently, in CSM 117 when the TVC relay changes state either going from enable to disable or from disable to enable, and it causes an electric glitch that makes the CDU's go to 90 degrees, in particular, the YAW CDU, and therefore the CMC thinks it's in gimbal lock and goes into a course aline mode. Some of the cases that could cause this, for example, are when you go to - when you select manual optics, you have the TVC relay enable and then if you go from manual to AUTO or if you hit the 0 optics switch with manual optics selected, or if you go from P52 to P00 with the manual optics selected, you will reset the TVC relay and that can cause the glitch. This is apparently what happened last night.

SC Okay, is it important for me to copy those things that cause this or are you going to give me a way to prevent it?

CAPCOM Negative. You don't have to copy those. That's just background. Now we're going to talk about what you can do here in P52's and maybe subsequently for the LOI's and P40's. There are 2 ways to approach the P52. There's a quick and dirty way which is simply to go to SCS control, and because with SCS control the TVC relay is not enabled. And by doing that you don't run the risk of

CAPCOM generating this GLITCH. It's not the way, however, that the guys are recommending because they have a procedure that they think will handle not only the P52, but the burn cases and they would like you to get that procedure, and you're going to have to copy that one.

SC Okay. How about running down that list of things that causes the TVC enable to change state again. Let me copy those this time.

CAPCOM Okay, will do, and these cases are not all inclusive, these are just some examples that we can bring up to you. First of all the TVC relay is enabled when you select manual optics. It is then, subsequently disabled if you go from manual to AUTO, or if you go to 0 the optics with manual selected, or if you go with go from manual to optics selected, if you go from P52 to P00. But these are probably not the only cases, they're probably just some examples that we know of.

SC Okay.

CAPCOM Another important point, Ken is that it changes state during the TVC gimbal drive check.

SC Yes, that's what I was afraid of. Okay.

CAPCOM Okay. We're going to - this next procedure that I have to read up to you is probably going to be the one that we'll use to try to get around that. And also, we'd like you to use it in the P52's because it allows us to monitor for the glitch, and at the same time prevents the glitch from bringing your platform down.

SC Okay.

CAPCOM Okay, if you're ready to copy. I'll read you up the procedures.

SC Copy this? Okay, I'll just copy this on a scratch pad and we'll put it in the appropriate place if that sounds reasonable.

CAPCOM That sounds real good. Number 1 we want you to key verb 48 enter and load noun 46, register 1. The first digit should be loaded as a 3. The rest of the numbers can be left as they are.

SC Okay, why don't you read on at about that pace, Don, and I'll just copy and then I'll read it back to you.

CAPCOM Okay, the second step is key verb 25 noun 07 enter 75, enter 1, enter 1 enter. That sets the average g flag, but does not turn average g on. The combination of those 2 will prevent the CMC from going into course aline. After you've done that you can select P52 and use your normal alinement procedures, and when you've completed the P52 to terminate this EMP, we'll have your key verb 48 enter load noun 46 register 1 with its original value whether that was 2 or 1 in the first digit. Step 2

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CAPCOM will have you a key VERB 25 NOUN 07 enter.
75 enter 1 enter, enter. That will then return you to the
correct DAP and also reset the average G flight.

SC Okay that was in VERB 25 NOUN on 75 enter
1 enter, and then 0 enter or 1 enter?

CAPCOM 0 enter.

SC Okay.

CAPCOM Okay that's the whole procedure.

SC Okay, let me look it over here for a
second. At first glance the first thing I see here looks
like (garble)

END OF TAPE

CAPCOM 16, we're switching OMNI's, hold off a bit.
 CAPCOM Okay, 16. How do you read now?
 SC Loud and clear.
 CAPCOM Okay. We lost com there temporarily. You can go ahead with the read on that any time your ready.
 SC Okay. Did you get my questions about the VERB 46?
 CAPCOM Negative, but we have our caution note that says do not key VERB 46 in there while all this EMP is in to prevent SAP, Saturn DAP actually coming on.
 SC Okay, thank you.
 SC Okay, what you would do then is, we're going to set Saturn DAP in average G in order to prevent course alining the event middle gimbal picks up spurious signals and we do this and we set VERB 48 with a NOUN 46 digit A is set to a 3 and we set the average G flag with a VERB 25 NOUN on 7, address 75 bit 1 set it to the 1, that's what you'd call P52 normally, and if the glitch occurs, it'll be ignored. I assume if the glitch occurs some time while we are in the process of taking marks, that we get some kind of garbage out of P52, but it should be obvious and from what you gave me on the list up at the top, normally we would not run across TVC and Able during that period. At the completion of number 52 we go back to a VERB 48 and now we take NOUN back to original values, then we reset the average G flag by taking channel 75 bit 1 to a zero, using VERB 25 NOUN 7 and the restrictions on this EMP is that we will not use VERB 46 at any time while this is punched in.
 CAPCOM That's affirmative Ken.
 SC Okay, do you have words on how we handle the P40?
 CAPCOM Okay, Ken, in the P40 is what we're thinking about. And we haven't completely decided now is we probably use this EMP before and after the TVC gimbal check, there we may move the TVC check gimbal earlier or before the burn so that we have plenty of time to get this thing in and out.
 SC Okay, that sounds like a good plan.
 CAPCOM Okay, now we got the last shovel full here if you are ready to copy.
 SC Okay, I've got my bucket out.
 CAPCOM Okay, if you should loose the platform alignment, we'll do the same thing we tried last night, a VERB 23 NOUN 20 enter, enter VERB 40 enter and then go to the check list, G 7-1 and do the rapid IMU realign.
 SC Okay, Don. If we tumble the thing again we're going to release the platform by setting NOUN 20 to zeros and do that with the VERB 23 NOUN 20 enter, enter, then we release the platform with the VERB 40 enter and then we go through page D 7-1 and get a rapid alignment to the GDC. I assume what happened to us was the glitch in the middle gimbal

SC If I understood your conversation, it's possible to have a glitch in one of the other gimbals. Is that correct?

CAPCOM That's correct. That will not, however, get you into the problem that causes platform to go into course align. Also, we recognize that while this EMP is in, you shouldn't have the problem of losing the platform alignment.

SC Okay. If we get a glitch in one of the other axes and we have the controls enabled, I assume one of the things we would see would be some unusual thruster activity.

CAPCOM That's affirmative and in that case all you need --

SC ... proper correction. Well, I'm trying to figure out what we'll do if we have a, say were in attitude hold. If we have that glitch occur right now and with our engines disabled I don't think there would be any way I'd see it till I went to use some auto optics or something. And if we were in an attitude hold, it appears to me that I would see a DAP that would appear to be unstable in the axis that it was going for or at least take off for some place other than where it is. And we would go SCS momentarily and the proper responses would be a VERB 40 enter and allow the CMC to zero and recount the IMU CDU Is that correct?

CAPCOM Right oh.

SC The TVC enable that we're talking about is used for the gimbal drive test, now that's a function only of the gimbal drive test and not a function of the setting of the trims in P40. Is that correct?

CAPCOM Yeah, that affirmative.

SC Okay, for P40 then, it would be something like we would go out and we'll get a gimbal drive check to you folks early, then we'll turn the gimbals off probably and I'm just theorizing what I'm ----

CAPCOM OMNI Switch coming up, 16 standby. Standby 16, we're switching OMNI's.

SC Roger.

SC Gimbal check to verify all the gimbals are properly hooked up. Then we would bypass the flashing 202 enter and we'd just let the gimbals go to trim and everything else would be done nominally.

CAPCOM Ken, I think your general impression is right. I guess we're not yet ready to commit ourselves to a set of procedures. We're going to have Stu take a look at it in the simulator here and we'll come up to you later with a detailed procedures specifically for the burn.

SC Rog. I understand that, I just wanted to make sure I had a general understanding if we had to do some original thinking.

CAPCOM Rog, John, I think we concur with what you said so far.

SC Okay, and the other thing just out of curiosity if the guys in the back room, after they get through getting all the important things squared away, that they could kinda think some more about their list of things that causes enabled relay to change state. I'll compile a list of those things in case we come across something later on that we hadn't thought about.

CAPCOM Okay, Ken, we'll do that. Oh, yeah, and there is one last note here, that prior to your P52's, it would be a good idea to align the GDC just prior to going in.

SC Yes, sir, I don't think I'll let that guy get very far away from us.

CAPCOM Roger.

CAPCOM And Ken, I've got an update to the GNC check list on page 9-4 any time you are ready to copy.

END OF TAPE

SC GARBLE.

CAPCOM And Ken I've got an update to the GNC check-list on page 9-4 anytime you are ready to copy.

SC Okay, pencil in hand.

CAPCOM Okay, on page 9-4, line 0.7 replacement for line 0.7 should read 76747. Line 11 should read 77552. Line 12 77756 line 13 77307.

SC Okay I'm on page G 9-4 reading down column A. On line 7 I replace 77426 with 76747. On line 11 I replace 00214 with 77552. On line 12 I replace 77714 with 77756. Line 13 I replace 77446 with 77307.

CAPCOM That's correct Ken. And we've got, Ken, here some notes on this jeton monitor EMP we'd like to do a check on it at 5425 and I can read you up the procedure for that anytime you are ready to copy.

SC Go ahead.

CAPCOM Okay at 5425 in the flight plan we would like to add P20 option 5, in the LM checkout attitude. NOUN 78 minus 09000 minus 03000 plus 25500. NOUN 79 plus 00050. NOUN 70 plus 00047. We will uplink the jeton monitor loads and when the P20 maneuver is complete you can do a VERB 74 at ENTER. And the P20 attitude that we've selected will be the attitude that you are already in, so there is actually not a maneuver involved here.

SC Okay, would you say when maneuver complete, does that mean that you would want us to maneuver to the LM checkout attitude using P20, or are you going to let us go to VERB 49 for that. I'll call it up in bypass maneuver, is that correct?

CAPCOM You can use a VERB 49 for that Ken.

SC Okay, understand VERB 49 and then will call P20 and then command the same attitude OMNI.

CAPCOM That's affirmative.

SC I've got the 50:18 the second time. Then you want the VERB 74 ENTER.

CAPCOM That's affirm. Coming up on an OMNI switch, 16, standby.

CAPCOM 16, how do you read me?

SC Loud and clear now.

CAPCOM Okay, the only other thing is at 56 hours that's 5600 we want you to terminate the jeton monitor EMP.

SC Okay can you tell me what deadband you are going to be setting in there?

CAPCOM Stand off. Okay Kid, it'll be a 1 degree deadband.

SC Okay, you're setting me in the MP at 1 degree deadband, is that true?

CAPCOM That's (garbled)

CAPCOM Ken, on a noun 70 I read you a plus 000 47 You actually don't need that plus, that's an octal number.

SC Okay, it's not clear to me, if we are going to exceed this or not, we normally would not. Do you want to try letting us drift out of the deadband and see if the monitor works?

CAPCOM Negative, that's not the intent. I think they just want to get the program in and look at it.

SC Okay, well, sometime before we get through, would you ask them if they would object to letting us see if that thing triggers the same response as we're used to.

CAPCOM Okay, Ken, we'd like to think that over. We'll get back to you on that.

SC Okay, fine. Thank you.

CAPCOM Okay, now I still got this dump that we had since about 24 hours ago on changing the angle on that sun wheel and if you have that out now, we can clean that up; otherwise I'll hold it a while.

SC I don't have it out, but why don't you tell me what it is. I think I know what you are talking about. It's due to the REFSMMAT angle on there being changed.

CAPCOM That's affirmative and we inked 27 degrees on it and we should have written in 37 degrees.

SC Okay, it turns out we're at (garbled) at 27 and it should be 37.

CAPCOM That's affirmative.

SC Okay, thank you. Glad you remembered that.

CAPCOM Roger.

END OF TAPE

SC Okay, it turns out that we're at the (garble)
that 27, it should be 37.

CAPCOM That's a birdie.

SC Okay, thank you. I'm glad you remembered
that.

CAPCOM Roger.

CAPCOM 16, terminate battery BRAVO charge.

SC Okay.

SC Okay, it's inward.

CAPCOM Roger.

SC (garble). About one in a million.

CAPCOM (garble).

SC Say that again, Pete? You cut out.

CAPCOM 16, I guess we really don't know the
answer to that. That's one of the reasons we want to this
EMP to kind of a watch point and see if it is occurring fre-
quently or infrequently.

CAPCOM (garble) 16.

SC Okay, Don, we're going to go ahead and
punch through this P52 and we'll start with a little procedure
here and you might kind of watch us through and make sure we
get it right the first time.

CAPCOM Will do.

SC Okay, Houston, your watching us right?

CAPCOM That's affirmative we're watching you can go
ahead.

SC Okay, and what did you say probability
was of this thing happening.

CAPCOM I think we don't know the answer to that
John, that's why we want to load this software program so we
can monitor to see if that glitch is occurring frequently or
it may never occur again, we really don't know.

SC Understand. Okay I've got it in I'm
going to call P52.

CAPCOM Roger.

CAPCOM Have you got the GDC lined up?

SC Oh yes, you better believe it.

END OF TAPE

SC Houston, how do you like those angles?
CAPCOM Just a moment.
CAPCOM They look real good, 16.
SC Do you want us to torque some that small?
CAPCOM Go ahead, torque them.
SC Okay, we'll do it at 17 minutes - I
guess that's 18, excuse me.
CAPCOM Understand 18 minutes.
SC Okay, would you like for me to return
it to zero with the switch in manual this time just to see
if we get that glitch?
CAPCOM (garble).
SC Going to zero. Mark.
CAPCOM 16, we didn't see any glitch. There,
we're coming up on an OMNI switch.
CAPCOM 16, that EMP that we loaded to protect
the platform, we'll refer to it as EMP 509.
SC Okay, 509, sounds familiar.
CAPCOM Does it?
END OF TAPE

CAPCOM 16, you and set we've got up-
link for you, and I've got I've got news if your interested.
SC Okay here's POO and ACCEPT and yes we're
interested.

CAPCOM Okay, former president Lyndon Johnson is resting comfortably after he was hospitalized again following an increase in his heart rate. He's hospitalized in San Antonio. Vice President Agnew speaking here in Houston has asked the nation super market executives to hold the line on prices. If prices for food continue to soar Mr. Agnew hinted at mandatory federal control. President Nixon added a stop during his scheduled trip to Moscow. Prior to returning to home he will stop off in Poland to discuss Polish American relations. The Moscow trip in late May is still on despite some fears that recent development in the Vietnamese conflict could affect the Presidents visit to the Soviet Union. State news, the Texas governors race is still a hot item, but no word yet from John Connally who said he may speak out on the wide open race. Congressman Bob Eckhardt says the U.S. needs at least 3 large super ocean ports to keep in contention with the world market. He says the Galveston Houston area is a prime super port site. And in sports news the Astros captured their first victory of the year with a 7-2 win over the L.A. Giants and some scores on the other games in the American League, Cleveland 4, Boston 0; Baltimore 4, New York 0; in the National League St. Louis 5, Philadelphia 4; Los Angeles 8, Atlanta 3. The Boston Marathon run yesterday on patriots day in Bean Town was won by 25 year old Engineering student from Finland. Strangely enough they have omitted his name. A 33 year old Long Island New York woman Nina Kousick won the special ladies division. The Los Angeles Lakers and the Milwaukee Bucks are tied 2-2 in the Western division playoffs in the NBA.

SC Charlie wants to know consolidated Jack
Pine is doing.

CAPCOM Was that consolidated Jack Pot?

SC Jack Pine.

CAPCOM Roger.

SC They lost 3 or 4 points yesterday.

CAPCOM Rog. Charlie I guess I haven't got those
figures handy we'll see what we can do.

SC If you can find out Pete I have been
trying for 10 years.

CAPCOM Okay, Charlie and you can have your
computer back, 16.

SC That compensation you guys put up there
really fixed that baby.

CAPCOM Yes, seems to have.

SC (garble) Ken marks.

SC (garble) so we can pick up some (garble).
So we're going (garble).
CAPCOM We've got an OMNI switch 16, stand by.
SC Houston, you read Casper?
CAPCOM Your pretty weak.
CAPCOM 16, can you read now?
SC Yes, I read you now. Did you copy when
I commented about the Skylab food.
CAPCOM Negative.
SC Pete, I'm back on the biomed, how does
it look?
CAPCOM Stand by one.
CAPCOM Hey, Charlie their just now starting to
get it, they'll take a look at I'll let you know in a minute.
SC (Garble).
CAPCOM Okay, you want to go ahead with you
comments on the Skylab food, now.
SC The comment I made Don, was that because we're
behind the timeline, here we thought we would put the Skylab
food off until tonight, and we're just going to eat snacks
now and try to get caught up a little bit.

END OF TAPE

CAPCOM Okay, we concur with that Ken.

SC Rog.

CAPCOM 16, we would like to get the high gain up on this next rev, you're about 10 minutes away from it now. Do you think you can make that? If not, we can wait another --

SC We'll get it to you.

CAPCOM Okay, it's pitch minus 40 and yaw plus 90. And Ken, you can go on your -- in your checklist there down to the MSFN key any time you are ready.

SC Houston, 16, over.

CAPCOM Go ahead, 16.

SC Okay, Pete, I hit a command reset there. I went to high gain too soon, and we're operating now in OMNI BRAVO, and give me a mark. The high gain just didn't seem to work -- it looks like I ought to be able to get high gain now I'm trying.

CAPCOM Negative, you won't be able to get it yet.

SC Okay. Okay, you're on OMNI Charlie now.

CAPCOM 16, we'll handle the OMNIs until we're ready to go to the high gain. We'll tell you when to go to high gain at the angles we just gave you.

SC Okay, we're all set, and you're in OMNI Charlie. Do you want me to reconfigure?

CAPCOM Come back to BRAVO.

SC Back to BRAVO. You're in OMNI BRAVO.

CAPCOM Okay, thank you John.

CAPCOM 16, would you go ahead and start the pan camera, and mapping camera film cycling procedures down to the point in the checklist where it calls for a MSFN key.

END OF TAPE

SC Houston, how much time until we get the
high gain?
CAPCOM A couple of minutes Charlie.
SC Okay.

END OF TAPE

CAPCOM Okay, 16, you can bring up the high gain.
CAPCOM 16, ring up to high gain now, please.
SC Okay, there you go, you got REACQ and
NARROW on the high gain.
CAPCOM Roger. 16, we're ready to procede with
the film cycling.
SC Okay. Okay, the mapping camera is coming
on, stand by.
CAPCOM Roger.
SC Okay, you ready for mapping camera pan
camera operations.
CAPCOM Stand by one. 16, stand by we're checking
a couple of temperatures. Okay you can proceed 16.
SC Okay, mapping camera is coming on. And
the pan camera self-test has been hit. Okay the pan camera
mode barber pole has gone back to gray, that took about 40
seconds.
CAPCOM Roger.
SC Mapping camera is off. Houston, do you
copy, Casper.
CAPCOM Through loud and clear, Casper, go ahead.
SC Okay, the next item here is to take the
mapping camera to stand by mode and I assume I should do that
before I turn the spec power OFF.
CAPCOM That's affirmative, 16.

END OF TAPE

SC Roger 30 of 60.
CAPCOM Alright, Casper after you turn the mapping camera to the standby mode we want you to add pan camera self test to heaters.
SC Okay, you've got heaters now and we're in standby I'm about to turn the SMAC power off unless you want me to hold it.
CAPCOM Leave it on, Casper. Leave that power on.
SC Okay.
CAPCOM 16, go OMNI BRAVO. You can stow the high gain.
SC Houston, Casper.
CAPCOM Go ahead, Casper.
SC Okay, after the film cycling you normally call for taking the SMAC power off and you asked that we hold there, do you want us to complete the rest of that power down or do you want us to just stop there and you'll pick it up later or what did you have in mind.
CAPCOM We want to leave the heaters on for awhile and the power on then we'll pick it up again later at about 58 hours, but we'll call you.
SC Okay, we'll leave it in your care.
CAPCOM Roger.
SC And if your ready Houston we'll go ahead and stop PTC and go over to the UVS (garble).
CAPCOM Okay.

END OF TAPE

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SC UVS (garble)

CAPCOM Okay.

SC It's surely a shame to kill a PTC that looks
as nice as this one.

CAPCOM Yes, it does.

CAPCOM Casper, do you want to try killing this
roll at 208 which is your next roll attitude?

SC We're with you.

END OF TAPE

PAO This is Apollo Control 52 hours 17 minutes ground elapsed time. Apollo 16 now being maneuvered into a high gain antenna attitude leaving the passive thermal control after all night and most of the day. Midcourse correction 3 will not be performed and it's likely that midcourse 4 will not be either. In as much the present calculations show that correction would about 1.4 feet per second at the present time. We should be getting some improvement in communications when we do get locked up on the high gain antenna. And we're continuing to stand by at 52:18.

END OF TAPE

SC Hey, Don.
CAPCOM Go ahead, Ken.
SC Let me tell you, all our plans for peanut
butter were correct. That's the ideal space food.
CAPCOM Rog. You guys going to do the SKYLAB thing
tonight?
CAPCOM 16, Houston, are you reading?
SC Loud and clear. Loud and clear.
CAPCOM Okay, we're just doing a subcarrier voice check.
SC Your subcarrier has a good voice and Ken's right
about that peanut butter sandwich. It's like when we're aboard ship,
you can get a peanut butter sandwich when we're in too much of a
hurry to do something else -- to do anything else, and it works[
CAPCOM Okay. We'll pass that along.
CAPCOM Casper, I've got that list of TBC relay set
and reset conditions anytime you're ready to copy.
SC I'm all pencil.
CAPCOM Okay, the conditions that set the relay are:
One. Spacecraft control switch CMC optics zero switch OFF, and
optics load switch MANUAL.
SC What to MANUAL?
CAPCOM Optics load switch MANUAL, and number two,
another way to set it is start on CMC TVC gimbal drive check
in P 40. Okay, the different ways that it can get reset are:
Number one. Optics zero switch zero. Number two. Optics ze-
ro switch OFF, and the optics load switch to CMC. Number three.
Spacecraft control --
SC Hey Don, would you standby for a minute,
please.
CAPCOM Sure will.
SC Let's get our (garble) on that time and I'll
come back with you.
CAPCOM Roger.
SC Houston, 16.
CAPCOM Go ahead, 16.
SC Okay, on your plat board, Pete, what do you show
us over now?
CAPCOM You're just about over Florida. Coming down
over the tip already.
CAPCOM 16, could you verify the position of the S-
band OX TV switch?
SC Yes, it's still in SCI, are you going to
tell us --

END OF TAPE

CAPCOM Off TV switch.
SC Yes it's still in SCI we figured you guys tell us to finish us our film cycling check list.
CAPCOM Understand its in SCI.
SC That's affirmative.
CAPCOM You can take that switch to OFF, but leave the pan camera heaters and stuff on.
SC Okay, well since you don't want us to do the exact check list we'll turn the SCI off and data system off or you want the data system on. Your not reading anything now I don't think.
CAPCOM Just leave the data system on. We've commanded it off on the ground.
SC Okay, data system on.
CAPCOM Okay.
SC Houston, with the Anox out looking at the earth we can see Florida and the real blue water around the Bahamas. On around the Gulf of Mexico looks like you might have some clouds near Houston and on down into Mexico and the Great Lakes up in the North where there is alot of clouds on up North of that.
CAPCOM Roger, it is overcast here Charlie.
SC (Garble). And up in the Polar ice cap there is a big broken line looks like a river or something running down off to the southwest wonder what that feature might be.
CAPCOM Does it look like - is it a feature on the ground or a feature in the clouds?
SC I thought the whole thing was just snow and ice up there maybe it is a clouds - it looked like to me its just up at the North Pole in the ice cap area.
CAPCOM Roger, understand.
SC And its been there since we launched.
CAPCOM Roger.
SC What it appeared to me to be was some place its thawed out up there, but - and I was looking at water but that might be the clouds actually.
CAPCOM Okay, Toney is sitting here I'll see if he knows anything about it.
SC Okay, and that storm system that was out West of Alaska or thereabouts appears to be still there.
CAPCOM Okay.
SC Okay, Don I'll bring the copy of the rest of those things that we sent the TBC and ABLE.
CAPCOM Okay, standby just a minute their adding a couple of notes to it.
SC Sure thing.
SC Can I read back (Garble) when I read back the ones that said it?

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CAPCOM Say again, Ken.

SC I'll just wait till you get it all, I was going to read back the one that sent it. Everybodys talking about those binoculars we pulled those things out in earth orbit as we go toward the states and it's pretty impressive. It works out well in other places it really does enhance things you can see.

CAPCOM Roger. Okay I've got this list on the TVC relay set reset conditions again if you want to go back into that now.

SC Okay, all set.

CAPCOM Okay, the note they added was backup ...

END OF TAPE

SC (garble)
 CAPCOM Roger. Okay, I've got this list on TVC relay set/reset conditions again, if you want to go back into that now.

SC Okay, all set.
 CAPCOM Okay, the note they added was back up on the very first thing I gave you, the number one conditions to set the relay. Those conditions only work in certain programs or extended VERBS and those are: P20, 22, 23, 24, 52, or VERB 41 NOUN 91.

SC Okay.
 CAPCOM Okay, and I believe we've gotten down through numbers -

SC All options (garble) P20 - ?
 CAPCOM Stand by one, Ken, and I'll get you an answer on that.

SC Okay, go ahead.
 CAPCOM Okay, while we're waiting for them to decide whether it's all options or not, I believe we got down through number 2 reset conditions.

SC Okay, I copied the optics to zero and the optics zero off when in CMC mode control.
 CAPCOM Okay, and that was number 2. Number 3 is spacecraft control switch SCS number 4, is THC clockwise. Number 5 is VERB 37 inner, XX inner. Number 6 is fresh start VERB 36. Number 7 is VERB 34 or pro in the siding mark routine, R 53 display. Number 8, is AUTO enter RCS DAP at SPS cutoff plus 2.5 seconds in P40.

SC Okay, I didn't understand that one, Don.
 CAPCOM Okay, it's the - it's what happens to you immediately following the burns - the SPS cuts off and then 2.5 seconds later in P40 the TVC relay gets reset.

SC Okay.
 CAPCOM Okay, and on the question of options back up under set condition number 1, it's all options except number 2 in program 20.

SC Okay.
 CAPCOM And that's all of them.

SC Okay and I understand that this - this can happen when you either set or reset, enable relay, is that correct?
 CAPCOM That's affirmative, they say it can happen going any change of state on the TVC relay.

SC Okay, can you tell me if it's the change of state of the relay, or just the command to change. For instance if we already had it in some of these things like a VERB 37 any program, resets it but if it's already in the reset position is that a condition that is likely to trigger one of these things, or is that one of the safe conditions?
 CAPCOM We think, Ken, it's the actual relay set/reset changing, not the command.

SC Okay.
 SC Don, let me read back what you read to me and then I'll want to mull that over for a while

SC and see if I have any other questions.

CAPCOM Okay.

SC Okay. And I think except the TVC enable (faded out).

CAPCOM 16, you're fading out, we are unable to read.

SC Okay, the things will set the TVC enable. The spacecraft control switch to CMC. The optic zero to OFF. The optics mode to MANUAL. And the CMC TVC gimbal test P40. These things occur only if I'm in P20 options 0134, P22, P23, P24, P

END OF TAPE

SC options 0134, P-22, P-23, P-24,P-52, VERB
41, NOUN 91.

CAPCOM Okay, Ken, on that first 3 of those con-
stitute one set of conditions and the last one that is, the
start of CMC thrust spec to control, is another condition that
is sufficient by itself.

SC Okay, understand, the first 3 go with those
programs and the CMC thrust spectra control is sufficient by
itself.

CAPCOM Okay.

SC Did you -- I don't remember if we concluded
whether that was one CMC sensor gimbal in preparation for the
burn or only during that test.

CAPCOM I don't think that's -- at least I haven't
been advised as to which set of conditions we're talking about
there.

SC Okay, now I'll read you the reset once.

CAPCOM Okay.

SC An OPTICS to 0, OPTIC 0 to OFF when in
CMC mode, spacecraft control to FCS, translation hand controller
to clockwise and VERB 37 enter to XX enter. I press start,
VERB 34 or probe when in the siting mark display. And the
auto engine OFF or auto to PBC reset after a burn in P-40.

CAPCOM That's affirmative. There are 8 different
reset conditions number 2 actually contains 2 separate items.

SC Affirmative. (garble)

CAPCOM Okay.

SC Okay, Houston, we're starting to fuel
cell purge and waste water dump.

CAPCOM roger, copy.

END OF TAPE

CASPER Houston, Casper.
CAPCOM Go ahead, Casper.
CASPER Okay, we've got a LM Delta P of 0.6
we would like to ahead and pressurize the cabin to get ready
for the LM entry.
CAPCOM Standby one.
CAPCOM Okay, Casper, we copy and you can go ahead.
CASPER Thanks.
PAO This is Apollo Control at 53 hours 7 minutes
ground elapsed time. We're having a change of shift here in
the Mission Control Center. Pete Franks' team of flight con-
trollers coming on relieving Jerry Griffin's gold team. There
will be a change of shift briefing with the flight director,
Jerry Griffin and the spacecraft communicator Hank Hartsfield
in about 15 minutes in the news center briefing room. The crew
at the present time is preparing to transfer into the Lunar
Module for the activation and checkout transferring the pres-
sure garments into the LM. And at 53:08 and still up live,
this is Apollo Control.
CASPER Okay, Houston, waste water dump is termin-
ated at about 12%.
CAPCOM Okay, Charlie, we copy that.
CASPER And, Tony, we're into the equalizing the
pressure CM LM at this point.
CAPCOM Okay.
CAPCOM Apollo 16, Houston.
CASPER Go ahead.
CAPCOM When you're working up there in the hatch
area, I've got a test for you on that docking latch 10 -- when
it's convenient you might let me know when you do work on it.
CASPER Okay, why don't we wait until the guys get
into the LM, and then I'll work on that while they're doing
that.
CAPCOM Sounds good.

END OF TAPE

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CAPCOM
SC

Apollo 16, Houston, OMNI Charlie.
Okay.

END OF TAPE

PAO This is Apollo Control at 53 hours 28 minutes. The LM televiewer, one of the Lunar Module flight controllers here in Mission Control has just reported that from his telemetry data it looks as if the crew has opened the hatch preparing to enter the Lunar Module at this time. They're scheduled to spend about 50 minutes to an hour in the LM on house-keeping activities, in what will be the third entry into the Lunar Module Orion during the course of this mission. A change of shift press briefing is scheduled to begin shortly in the MSC news center briefing room. During the course of that briefing, we will tape record any conversations with the crew for playback immediately following the briefing.

ORION The Orion is on internal power at 53 28 and 34.

CAPCOM Okay, we copy that, Ken.

PAO This is Apollo Control. The change of shift press briefing is ready to begin. We'll switch at this time to the MSC news center briefing room.

END OF TAPE

PAO At 54 hours during the change of shift briefing, John Young and Charlie Duke entered the lunar module, Orion. They powered it up check the communications system, completed their housekeeping activities aboard the LM and are in the process of returning to the command module. The total time from the time the LM was switched to its own power until they were back on the command module providing power to the lunar module was about 21 minutes. Again, as on the two previous occasions when we've had a look at the lunar module systems when the data has been transmitted back to earth all systems on that vehicle look good. We'll play back the accumulated tape conversation with the crew at this time.

SC Houston, 16 we're in Orion now - you've got the com on you should be getting high bit rate momentarily.

CAPCOM Okay, and we would like some high gain.

SC Okay (garble). You mean on Casper's side.

SC Okay, Houston we just got some (garble) on Orion.

CAPCOM Okay, we have LM data.

SC Hey, Tony ask (garble) about this 192 package lanard. I look at it yesterday and I could see red and green. It's way out and looks okay to me is that copasetic.

CAPCOM Okay, we'll find out.

CAPCOM And Charlie we've got some changes to the lunar surface checklist whenever it's convenient for you we'll send them up to you.

CAPCOM Charlie, Houston.

SC Go ahead.

CAPCOM Okay, Tony says that's okay no problem.

SC That's fine and what did you want to update? What checklist?

CAPCOM Okay, your lunar surface checklist and your LM cue card for EVA prep.

SC Okay, Tony I have the cue card go ahead.

CAPCOM Okay on the cue card it'll be all of them. EVA 1, 2, and 3 and I have one here for post EVA. Okay on the EVA 1, 2, and 3 after the sentence read cliff 02 quantity to Houston. We'd like to add the line.

SC Wait a minute, hold on.

CAPCOM Rog.

SC Okay, I've got EVA 1 prep now which column?

CAPCOM Okay, it's on the left hand column right the bottom line, says read cliff 02 quantity to Houston.

SC Okay, I've got the (garble) plus 02 quantity to Houston and the next one is a note is comm is no go is that the one that you want?

CAPCOM Rog, we'd like to put a line in between re plus 02 quantity and the note.

SC Go ahead.

APOLLO 16 MISSION COMMENTARY 4/18/72 CST 17:55 GET 54:00 180/2

CAPCOM Okay. Squelch VHFB (LMP) - full decrease.

SC Okay, got it.

CAPCOM Okay, now in EVA 2 prep cue card.

SC Go ahead.

CAPCOM Okay, this is a left hand column and this
is the bottom and we add the same line there squelch VHFB LMP
full decrease.

SC Okay, go ahead.

CAPCOM Okay on the EVA 3 prep same as EVA 2 prep.

END OF TAPE

ORION Okay, go ahead.
CAPCOM Okay, on the EVA 3 prep, the same as EVA
2 prep.
ORION Okay, go ahead.
CAPCOM Okay, now this is on the post EVA 3 cue card.
ORION I got it - go ahead.
CAPCOM Okay, on the third column, 1/3 of the way
down, it says audio circuit breaker CLOSE.
ORION Okay, got it.
CAPCOM Okay, we would like to add a line right after
that. Squelch VHF B, LMP, noise threshold, plus 1 1/2.
ORION Okay.
CAPCOM Okay, the point of all of this is to increase
the range of flip to LM, in case you're having a crew failure.
ORION What else you got?
CAPCOM Okay, it's the same sort of changes to
your lunar surface checklist, and I'll read them to you when
you're ready.
ORION Okay, Tony, we never use that checklist at
this time frame, we'll copy it in in a little bit, okay?
CAPCOM Okay, that's fine.
ORION Houston, 16.
CAPCOM Go ahead, Charlie.
ORION Okay, I'm a little confused about your
terminology, I guess, it says squelch VHF B LMP to equal de-
crease -- we've only got one VHF B to squelch.
CAPCOM Right, I understand that. The LMP was just
a cue that you're the only one on the com at the time, so you'll
be the one to have to listen and get it down.
ORION Okay.
CAPCOM Charlie, Houston.
ORION Go ahead.
CAPCOM Okay, when you get a chance there, we would
like you to read the ED voltage, both A and B.
ORION Exactly the same thing as yesterday -- 37
volts Tony, both of them.
CAPCOM Okay, good show, and verified off.
ORION Rog.
CAPCOM Okay, Apollo 16, I guess that's all they
need in the Lunar Module, at your convenience you can power
down and could you read that tunnel index that you go through--
the clocking index.
ORION Strange to say, it hasn't changed any. It's
still minus 3 1/2.
CAPCOM All right, okay, we copy.
ORION You were going to tell me something about
this latch, ten, too.

CAPCOM Okay.
ORION Do you want to do that now?
CAPCOM Yes, it would be a good time, if you're ready.
ORION I'm sitting here looking at it.
CAPCOM Okay, on that docking latch number 10, de-
press the yellow auxiliary relief button, noting that the button
will depress, and whether it stays snapped in after being de-
pressed. Now the interest here is if the button will not depress,
the latch mechanism is either stuck or broken. If the button
stays snapped in, this indicates -- it probably indicates that
the latch was only partially cocked at launch --
ORION It's in --
CAPCOM -- and stayed in.
ORION It's in and it stayed in.
CAPCOM Okay, then the indication of that is that
it was only partially cocked at launch.
ORION Well, do you want me to recock it (garble)?
CAPCOM No, they had just as soon you leave it the
way it is, because if it is broken it may not be able to get it
off again, and then it would foul up the undocking.
ORION Sounds like a reasonable plan. Okay, I've
got the aux relief button pushed in, and it stayed there,
and the rest of it is going to be left as is.
CAPCOM Okay, good show. That's it.
ORION Okay, Tony, we're going to get our suits on.
CAPCOM Okay.
CASPER And Houston, we brought LM power back to CSM
at 53 49.
CAPCOM Okay, we copy that.
CAPCOM And Ken, we have a correction to that TVC
relay set condition.
CASPER Okay.
CAPCOM Okay, on the set and program P 20, we read
up previously --

END OF TAPE

SC Okay.

CAPCOM Okay, on the set and program P20 we read up previously that it wouldn't set in option two we've got a correction to that. It sets only in option 0 and 4.

SC Understand that it sets in only option 0 and 4.

CAPCOM That's correct.

SC Tony I'm still trying to get some pictures of some selected portions of suit donning on 16 millimeter. And I just checked here on the spot meter and it looks like the CIM is going to be marginal for this and I'm looking at the CBW that available. And I wonder if anyone would object if I put it on magazine hotel hotel.

CAPCOM Okay, I'll check on that.

SC Thank you, sir.

CAPCOM Ken, Houston.

SC Go ahead.

CAPCOM When your ready for the (garble) monitor program we're ready to load it.

SC Okay, I'm in P00 and I'll give you ACCEPT.

CAPCOM Okay.

SC You've got it.

CAPCOM Okay and I guess you'll have to go to P20 for us to load it.

SC Okay, you want me to be in P20 first.

CAPCOM That's affirmative.

SC Well, that was almost right. Your in ACCEPT P20.

CAPCOM Roger.

CAPCOM Ken, Houston.

SC Go ahead.

CAPCOM Okay, we've got a answer in on this hotel hotel you have about 10 percent available to use now if you like and if you use the spot meter inside you'll have to settle for ASA of 4 000.

SC That's affirm. Thank you I can use 10 percent.

CAPCOM That's right.

CAPCOM Ken, Houston.

SC Go ahead.

CAPCOM Okay, we've got your program loaded you can press on with the NOUN 26.

SC You'll have to stand by a minute.

CAPCOM Okay.

SC Okay, Tony what did you want the NOUN 26 loaded up.

CAPCOM Right, you can go ahead and call your NOUN 26.

SC Okay, we're in the LM trying to get some

SC pictures of their suits zipping up.
CAPCOM Roger, I bet that's a real hassel.
PAO This is Apollo control that completes
our playback of the accumulated tape. We'll continue to
standby now and monitor the conversations live.
SC Okay, Tony does that look right for
NOUN 26.
CAPCOM Yes, that looks right.
SC (Garble) was the R36 not sliding over
to the end.
CAPCOM Stand by one.
CAPCOM Ken, Houston.
SC Go ahead.
CAPCOM Okay, if you'll call up VERB 526 it'll
slide over right now your not reading the third register.
SC Thank you. Okay, you want me to do a
VERB 31.
CAPCOM That's affirmative. Okay, Ken that's
right.
SC Okay, and we don't want to check out the
alarm function or are we just going to check out the loading
and unloading.
CAPCOM I think they've got something in mind for
alarm function later but nothing right now.
SC Okay, thank you. I'll got back over and
see if I can get some pictures of the LM.

END OF TAPE

AFOLLO 16 MISSION COMMENTARY 4/18/72 CST 18:10 GET 54:15 183/1

CAPCOM Ken, Houston.
SC Go ahead.
CAPCOM I guess they would like a EMI now.
SC You've got it.
CAPCOM Okay.
SC Anything else before I go into the LM?
CAPCOM Everybody is shaking their head I guess
it's okay about the time the hatch we'll think of something.
SC Okay.

END OF TAPE

SC And Tony, we used only 5% on (garble)
but 15% on magazine HH.
CAPCOM Okay, we copy that.
CAPCOM And when you get back in the command module
there we'd like for you to go to block on the CM.
ORION Okay, in block and Charlie's coming up on
the collar and I'm going to don my suit.
CAPCOM Okay.
ORION Houston, 16 How you read?
CAPCOM Ah, you sound good, Charlie.
ORION Okay.

PAO This is Apollo Control at 54 hours 44
minutes. The Apollo 16 crew at this time is in the process
of donning their pressure garmet assemblies, without helmet
and gloves. Young and Duke, are then scheduled to re-enter
the lunar module and return to the command module and the
exercise is part of a check of the procedures that the crew
will be using on the day that they performing the landing on
the Moon in suiting up and entering the LM. Following this
exercise the crew is scheduled to eat, during the eat period
they will be running the skylab food test. There are several
skylab food items packed in with the crews regular food. Such
things as snap top cans containing foods such as dried peaches
and puddings, peanuts. Also one pack with spoonable foods,
some postage stamp size salt dispensers, and the plastic
bellows drink containers. And while trying out this food
we expect that we will be getting comments from the crew on
how easy it is to use the food in its packaging and ease in
handling and preperation. They are also scheduled to take some
still and motion pictures of the food packages in use. Apollo 16
at the present time is 170,817 nautical miles from Earth and
the spacecraft velocity is 3,063 feet per second.

END OF TAPE

SC Houston, 16.
CAPCOM Go ahead, Charlie.
SC Okay, we're back in the LM - correction
back in the command module and Ken's closing out putting the
prcbe in right now.
CAPCOM Okay, sounds good. And there is no hurry
on this, but when Ken gets all comfortable we've got that
jet monitor test.
SC Okay, Ken's busy we'll give you a call.
CAPCOM Okay.
SC Houston, 16.
CAPCOM Go ahead.
SC Okay, stand by.
SC Okay, Tony you read.
CAPCOM Sure do sounds good.
SC Okay, during the suit donning went okay,
in fact pretty easy until we got to the part of John and I
zipping up. And in my suit in the LM zipping up John had an
extremely difficult time getting the restraint zipper closed
across the small of my back. It was extremely tight and the
only way he was able to do it was to zip the restraint zipper
in the front first so that the zipper would line up a little
bit better and then he got the back part closed. Now the
only thing that worries me is that the suit to me felt like
I had grown an inch or two and it was tight in the legs and
I didn't have the LCG on. And with the LCG and everything
else it might have built up where it would have been really bad and
we were wondering if it might be possible to if you guys would
let us let the legs out on this suit maybe a half an inch to
an inch. Over.
CAPCOM Okay, we'll talk about that. Go ahead.
SC I'm not even sure that would help but
it feels like it would to me.
CAPCOM Okay. Charlie I guess ...
SC Tony there was no trouble at all with the
pressure sealing zipper and the pressures it was just the
restraint. It was just in that one place in the small of
my back.
CAPCOM Okay, we copy that I guess that gives
us a data point, you go in zero-g.
SC That's what it feels like that I stretched
out an inch or so.
CAPCOM You better watch that you're pretty close
to your six feet.
SC Too late now. Okay, Tony the hatch is
back in.
CAPCOM Okay.
SC Houston, are you still there?
CAPCOM Oh yes, Ken, we're still here. How are

CAPCOM you doing?
SC Just fine got the tunnel closed out and
I'm ready to copy your next procedure.
CAPCOM Okay, stand by one.
CAPCOM Ken, Houston.
SC Go.
CAPCOM Okay, we'd like you to disable all the
BD roll jets and your cycling against the stops about once
every ten minutes and so expect that you'll get your ISS
light sometime in there and when you get it we don't either
turn back on the jets we just like to look at it awhile.
SC Okay, how about if I just go free?
CAPCOM Okay, I guess the free killed the jet
monitor.
SC Oh, okay.

END OF TAPE

CAPCOM Ken, just to verify that, if you go free -- CMC free, the program doesn't monitor, if you go back to AUTO it does. You don't have to put the program back in.

SC Rog, I understand that. I guess I just wasn't thinking -- what I did Tony, was rather than leave two Axes in control and one of them free, I put all in MANUAL attitudes switches (garble) command, and we're still in CMC Mode AUTO.

CAPCOM Rog, we saw that down here. It looks good.

SC Okay, you can watch it all day long -- whatever you want there.

CAPCOM Okay, we'll just watch.

END OF TAPE

SC Sure enough, there it is.
CAPCOM Okay, seems to work.
SC And, sure enough, just like advertised, there's no status flights on DSKY warning panel. And I'm going to go ahead, if it's okay with you, I'll turn off the channel 11 bit one.
CAPCOM Okay, go ahead.
SC Now we're still outside the deadband, that's not going to work unless I cycle it free and back to recenter the deadband. You folks want to watch it outside the deadband for awhile?
CAPCOM That's okay, I guess we're happy with it, and we'd like to go ahead and terminate it.
SC Okay.
CAPCOM And Ken, I guess you can go on to PTC at your convenience.
SC Okay, I was just getting ready to ask you about that, thank you.
SC Do you folks have me to continue using BD roll?
CAPCOM Rog, BD roll.
PAO This is Apollo Control at 55 hours 35 minutes. A short while ago Ken Mattingly reported that the tunnel had been closed out, indicating that Young and Duke had completed their suit exercise, were back in the Command Module. The tunnel hatch replaced after all of the probe and drogue assembly equipment had been reinstalled. And we heard Charlie Duke report that his suit -- when John Young attempted to zip it up across the back appeared to fill tighter than he was used to feeling in that suit. Charlie said he didn't feel this would cause him any particular problems, but he was concerned that perhaps the length would be too short when the suit was pressurized, and suggested the possibility -- or at least asked that the people here on the ground look into the possibility of lengthening the suit a bit using laces that are in the legs. This is a relatively minor adjustment and we're reviewing that possibility. And we will get back to Duke at sometime later in the mission with an evaluation of that suggestion. Following that, Ken Mattingly was involved in some activities using the onboard computer checking out a new program flying on this mission. This is a program which during Mattingly's solo activities in orbit around the Moon, would give him a warning using the inertial subsystem warning light on the display panel, to alert Mattingly to the fact that a thruster was stuck on -- should one of the thrusters stick, for example during a sleep period, an opposing thruster would then begin to fire to counteract the effects of this, and the result being an unnecessary depletion of a thruster propellant. In order to avoid this sort of situation, a change has been made in the

PAO one of the eraseable memory programs -- or actually an eraseable memory program has been added, which Mattingly will activate during that portion of the mission, and which would give him the warning through the inertial subsystem light, should one of the thrusters stick on. And then you heard the test of that program checked out and he got the light as expected. At the present time Apollo 16 is 172 327 nautical miles from Earth. And the spacecraft is traveling at a speed now of 3028 feet per second.

CAPCOM Okay, Apollo 16, OMNI Charlie.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/18/72 CST 19:34 GET 55:39 MC-188/1

ALL DEAD AIR

END OF TAPE

CAPCOM Charlie, Houston.

SC Go ahead.

CAPCOM Okay, on your tight suit there we were wondering if you could say a few words about how it felt during launch day.

SC Well, it was a little tight launch day. We - you know we fitted in pressurized Tony and it felt okay then. Launch day I thought the legs were a little tight but not much. Once we get it zipped Tony it feels a little tight but pressurized its okay. It's just the zipping part that's worrying us.

CAPCOM Understand.

CAPCOM Well, everybody is thinking about it, and we'll come back with an answer on it a little later. Right now I think the general feeling is that most people just as soon you not tamper with it unless you feel very strong about it.

SC Well, that's our opinion too. Our next solution or next question is maybe breaking out the LCG and putting all the gear on and seeing how it goes with all of the gear ...

END OF TAPE

SC That's our opinion too. Our next solution-- our next question is maybe breaking out the LCG and putting all the gear on and seeing how it goes with all of the gear. Our question there is if we break into one of the LCGs right now will it effect -- get any gas in the tubes will it effect the start up on the PLSS?

CAPCOM Okay, we'll work that one.

CAPCOM Okay, Charlie, we've looked at that LCG problem and you're right, if you break it out early you'll probably get gas in there and never be able to get it out and it will effect the cooling.

SC Okay, John and I were going to break into those LCGs and sleep in them tonight prior to PDI, what do you think about that idea then?

CAPCOM Okay, they're over there discussing that again.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/18/72 CST 19:52 GET 55:57 191/1

CAPCOM	Ken, Houston.
SC	Go ahead, over.
CAPCOM	Okay, your rates are low enough for the
PTC.	
SC	Okay, thank you.

END OF TAPE

CAPCOM Apollo 16, Houston.
SC Go ahead.
CAPCOM Okay, we'd like your on board readings H2
tank 1 pressure.
SC It's empty, Houston.
CAPCOM Okay, we copy that.
CAPCOM Okay, Ken, that's transducer problem probably,
they've had that history of problems with that transducer. Pre-
launch.
SC Yeah, we remember that.
CAPCOM Okay.
SC It was glitching launch day but it
looks like now it's sort of stabilized.
CAPCOM Copy.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/18/72 CST 20:04 GET 56:09 MC-193/1

CAPCOM	Apollo 16, Houston.
SC	Go ahead.
CAPCOM	Okay, we'd like you to go to OMNI Bravo,
instead of the high	gain and we'll handle the switching.
SC	Okay. You have OMNI Bravo.

END OF TAPE

SC Houston, 16.

CAPCOM Go ahead.

SC Okay, we're getting ready to go to work on this SKYLAB food preparation bit, and we're trying to check out these camera settings. We've got 16 millimeter magazine allocated for this with CIN film in it, and by checking the most light that I can get looks like on most objects we be running with the lenses wide open aperature and about a 60th of a second and I guess I'd like to know if you want to do that, or if you'd like to use a higher ASA and process the film differently.

CAPCOM Okay, we'll talk about that.

SC Tony, just looking here, and if we go to the eighteen millimeter lens we can open it up to at one. That gets our speed up to about a 250th looks like a lot better way to operate.

CAPCOM Ken, the com is pretty bad right now. We're having a hard time getting that. We understood that the light meter indicates that the film that was indicated to use here probably isn't going to be fast enough, and you are asking to use a faster film, but we didn't get there how severe the problem was.

SC Houston, 16.

CAPCOM Go ahead, Ken. The com's still pretty bad though.

SC Okay, we're going to get started on the by-static radar frequency check if you're ready.

CAPCOM Okay, Charlie, I guess we would like for you to hold off for a minute on that VHF test.

SC Alright.

CAPCOM Ken, Houston, the com may be a little better now, if you can go through the problem again.

SC Okay, Tony, it looks like it is not as bright in here as we would like to be able to get it. And we'll try --

END OF TAPE

SC Okay, Tony looks like it is not as bright in here as we would like to be able to get it, and we'll try timing it with some of the window shades up to see if we could get it a little bit brighter. The cabin front lights looks like a sixtieth of a second is about the max I can get off of the 10 millimeter lens and I was going to suggest either going to the 18 which will give me a little faster shutter speed because its got a wider aperture or we'll take a little less photography and just do it when the sun gives us good illumination through one of the windows.

CAPCOM Okay, we copy that we'll work it.

SC I think we can get more uniform photography if we did it with the window shades up and with all our lights in one fixed position that way we'll get a lot more photography done rather than have to wait. I really don't think you can afford to wait until the sun is in just the right place to do your eating.

CAPCOM Rog, understand.

SC Okay, Tony we're going to restow my suit if you guys don't want us to touch it.

CAPCOM Right, we're not going to worry about it tonight. We'll have some sort of an answer tomorrow. So you go ahead and stow the suit.

SC Okay. And our H2 tank pressure just dropped back down to 240.

CAPCOM Okay, we saw that.

SC It's back up to 270.

END OF TAPE

CAPCOM Ken, Houston.
CAPCOM Ken, Houston.
SC Go ahead.
CAPCOM Okay, after much debate I guess we can
have you go ahead and use the 18 millimeter.
SC Okay, thank you.
CAPCOM All right. If you're not already done
already.
SC I really think we'll get the -- we're
stowing one of our passengers here back in his suit bag.
CAPCOM (laughter) All right.
SC And --
CAPCOM Okay, I -- we're --
SC You'd be surprised just how long those kind
of things take. You start on something like that and it almost
fits and you refold it and it almost fits again and it's only
because you know it's fits that you keep trying with it. Cause
you sure couldn't prove it by us.
CAPCOM Understand. It doesn't sound like too
much fun. We'd like to reverse ourselves --
SC Ah, we didn't say that.
CAPCOM Right. We'd like to reverse ourselves
on something I sent up awhile ago. It doesn't seem to be any
problem with breaking out the LCGs early, they were thinking
about a skylab situation. So that won't be a constraint as
far as whether we want you to try it tomorrow we'll work that
and send it up tomorrow.
SC Okay, I guess the only thing on that is
that we've got a busy day coming and these things just really
take a long time by the time you put on the suit and then you
play with it and then if we have adjustments to do too. Why
It's going to take up a lot of time.
CAPCOM Right.
SC So the sooner the better I guess, just
so you know already.
CAPCOM Rog. But I particularly wanted to let
you know there was no problem with sleeping in it. That night
before.
SC That's a big help. Thank you.
SC Yeah, I didn't think there was, that's
what they did on Apollo 10.
CAPCOM Rog.
CAPCOM Remember Apollo 12 guys before you do too
much with that suit.
SC Okay.
SC Of course the problem is going to be if we
can't get it on at all, that's going to be a real problem.
CAPCOM Rog.

END OF TAPE

PAO This is Apollo Control at 56 hours 46 minutes. The crew should be shortly beginning their dinner which will include skylab food items that they will be evaluating. At last report Ken Mattingly mentioned that they were busily involved in restowing the suits and when that was completed, they would be scheduled to begin their eat period and to give us an evaluation of the skylab food packets that they will be trying out at this time. We've also had some additional reports, primarily from Charlie Duke, with some comments from John Young on the tight fitting suit. Duke first reported the suit appeared to fit tighter than he had expected. After they had gone through the exercise of donning the suits and entering the lunar module, in his latest report, Duke said that his primary concern was not for the suits fitting properly once it was pressurized then he felt that it would fit properly and be comfortable, but that they might as he was concerned that there might be problem in getting into the suit when wearing the liquid cooled garment. This was not worn during tonight's exercise and Duke suggested that it might be wise to put on the liquid cooled garment at some time and try getting into the suit to see if there would be a problem when getting into the suit in the same configuration that they will be using the day of powered descent, the landing on the lunar surface. We've recommended that the issue be put to rest for tonight and we are going to think about it here on the ground and see what steps might be taken tomorrow. And deal with the problem following the crew rest period. The Flight Dynamics Officer reports that the expected impact coordinate for the Saturn III stage, the S-IVB remained virtually unchanged. That predicted impact point is at 1 degree 50 minutes north and 23 degrees 18 minutes west and the predicted time of impact remains 75 hours 7 minutes and 3 seconds. This places the (noise) We just had a call to the crew. We'll standby for that.

CAPCOM	Apollo 16, Houston.
CAPCOM	Apollo 16, Houston.
CAPCOM	Apollo 16, Houston.
SC	Go ahead.
CAPCOM	Okay.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/18/72 CST 20:45 GET 56:50 198/1

SC Okay, go ahead.
CAPCOM Okay, we would like to start with the
VHF test when your ready.
SC Okay, give us a couple of minutes here.
CAPCOM Okay.
SC Okay, Tony we have VHF antennas on left
P is in duplex and the ranging is on.
CAPCOM And we're getting the VHF.
SC Roger.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/18/72 CST 20:52 GET 56:57 199/1

CAPCOM Apollo 16, Houston.
CAPCOM Apollo 16, Houston.
CAPCOM Apollo 16, Houston.
SC Go ahead, Tony.
CAPCOM Okay, we're going to draw up your S-band
uplink for a little while. We'll be back in about 10 minutes.
SC Roger, understand.
CAPCOM Apollo 16, Houston.
SC Go ahead, Tony.
CAPCOM Okay, we're back early. We'd like you to
go ahead and terminate the VHF and while your over that way
we'd like you to switch the high gain to wide beam.
SC Roger, high gain going to wide and ter-
minate the VHF.
CAPCOM Rog.

END OF TAPE

SC -- the VHF is terminated and you got wide on the high gain.

CAPCOM Okay.

PAO This is Apollo Control at 57 hours 24 minutes. The series of checks that we have been performing with the spacecraft using the onboard VHF and S-band systems are a preparation for an experiment that'll be performed in lunar orbit - the by static radar experiemnt which uses the spacecraft's communications equipment in a passive experiment to determine something about the electromagnetic properties of the lunar surface. The radio signals are reflected off the Moon, and the Moon affects the way in which they are reflected, and these characteristics are measured on Earth in an experiment performed by Taylor Howard of Stanford University. The VHF signals are received by the Stanford Research Institute in California, and the S-band signals are received by the Manned Spaceflight Network Station at Goldstone, California, the 210 foot antenna. Flight Dynamics officer advised us moments ago that while the crew is sleeping at 59 hours 19 minutes 45 seconds, we're scheduled to cross that mythical line known as the lunar sphere of influence, the point of which we begin calculating the increasing of the lunar gravity on the spacecraft. Our displays here in Mission Control shortly after that point are generally switched over to Moon reference from Earth reference. The velocities that we have been watching decrease steadily up to now, will then begin to increase as the spacecraft is accelerated toward the Moon. At the present time we show Apollo 16 175 461 nautical miles from Earth, and traveling at a speed of 2957 feet per second. As is usually the case when the spacecraft is this far from Earth, and when we're using the OMNI directional antennas and the spacecraft is rotating in the passive thermal control board, we do have some noisy communications as we drift from one antenna to the next. And this mission is no exception in that regard, and so we will have from time to time periods of noisy communications.

END OF TAPE

SC Houston, 16.

CAPCOM Go ahead.

SC We're trying to work on the pre-sleep checklist and this little part about the OPTICS to 0 and OPTICS power OFF, will any of that do these things we don't want to do with our TVC enable. How about just leaving it all like it is?

CAPCOM Okay, we're working on it.

END OF TAPE

SC Okay, Houston, are you ready for the on board
readout.

CAPCOM Yup, go ahead.

SC Houston, Apollo 16, over.

CAPCOM Go ahead, Apollo 16, we're ready to take the
readouts.

CAPCOM Apollo 16, Houston.

SC Houston, Apollo 16, over.

CAPCOM Okay, I guess we have that. A weak period
there. Yes, we're ready for your readouts.

SC Okay, battery C is 36.7 pyro battery A 37
pyro B 37, RCS A 87, B 90, C 92 and D 96. We are on Main A 29 volts.

CAPCOM Okay, we copy that.

SC And you'll be happy to know we've com-
pleted the skylab food evaluation with very few casualties.

END OF TAPE

SC And you will happy to know we completed
the Skylab food evaluation with very few casualties.
CAPCOM Congratulations.
SC And no loss of life.
CAPCOM Very good.
SC However it took a lot longer than we
allowed for it.
CAPCOM Okay.
CAPCOM And Apollo 16 I guess it's okay to go
to that optic 0 and 0 which you are and G and power optics off.
SC Okay, thank you now.
CAPCOM We aim to please.
SC Okay Houston are you ready for the E
memory dump over.
CAPCOM Okay, I guess we would just like you to
skip the E mod.
CAPCOM And Apollo 16, Houston.
CAPCOM Apollo 16, Houston.
SC Houston, you ready for a good E memory
dump?
CAPCOM Okay, John do you copy us now?
SC Yes, finally.
CAPCOM Okay, I think we'd like you to just skip
that E mod tonight. We do have a couple of changes to panel
230 when you get down that way.
SC Oh yes, we plumb forgot about that. Okay
go ahead.
CAPCOM Okay we would like a ...

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/18/72 CST 22:20 GET 58:25 MC-204/1

SC Okay, go ahead.

CAPCOM Okay, we'd like pan camera self-test off.

SC That's all?

CAPCOM Mapping camera off.

SC That's all?

CAPCOM And then down there below the service
module AC power off.

SC Okay, and that's all?

CAPCOM Okay, that's all we've got.

END OF TAPE

SC All right, Houston, 16. can I talk to somebody about chlorine injection.

CAPCOM Okay, what's the problem?

SC I'm not sure what my first problem is, I'll give you some symptoms. I put the chlorine in, and when I screwed down on it it seemed like it was just a little bit stiffer to screw down on than they had been before. But it wasn't obvious that it was that much different 'cause they're always a little tight. And when we went to take it off, I got a whole lot of water bubbling out from around the port I couldn't figure out where it came from. Seemed like it -- the first thing I thought of was the same thing that happened to 15 with the nut backing off. And when we got it out, it looked like the bubbling seemed to stop fairly quickly, and the first thing I tried to do was to take the collar of the adapter down tight, and right now I still have the chlorine injector adap--needle adapter still on the chlorine port. And I tightened it down by hand, and it seems like it's holding it. The chlorine ampoule itself was broken when we took it out of the injector drum. When all of that popped up, I wanted to get some buffer in with it -- you know the system, because it looked to me like some of the chlorine had gone in. So I started to try to put some buffer in and it looked like it might have leaked a little bit, and then I went to take it out out of the -- take the injector out of the adapter. And when I did it looks like it squirted --

END OF TAPE

SC ... out of the - taking the ejector out of the adapter. And when I did it looks like it squirts fluid from two holes that are 180 apart from each other on the adapter. And I guess I don't know what those two holes are for. Looks like maybe the needle is not going in, but I'm not sure what it is now. Do you have someone that might know how it's put together.

CAPCOM Roger, we'll talk about that. I know all about those two holes in that adapter.

SC Okay, these are the two on the outside now.

CAPCOM Rog, I know exactly which ones your talking about.

CAPCOM Ken, Houston.

SC Okay, go ahead.

CAPCOM Okay, when you put that buffer in would you verify that you left the nut all the way screwed down to the ten minutes and that's the period when the water was coming out the two holes.

SC No, the water came out of those holes - lets see now, I put the buffer in, I put it in the ejector and then I put the ejector into the adapter and when I went to screw down on the ejector it looked like it was starting to leak fluid around the ejector again. So I stopped and it didn't look like it was doing it anymore and I thought I would look to see, by this time I was getting suspicious that maybe the needle wasn't open so I decided to take the ejector off of the needle adapter. I took it off and everything looked okay and when I went to put it back on when I depressed the needle - when you push the ejector under the adapter that's when it looked like it squirted out of these two holes on the side and it did that several times and it repeated itself.

CAPCOM Okay, we copy that. Was the nut snugly against the ampule when you tried to put it back on. If you backed off of the nut it may have allowed the - it may have allowed the ampule to slide back up in the compartment there and then you were just opening up the needle.

SC Well, I thought it was down snug, if it wasn't snug would it push water out of those two side ports.

CAPCOM Yes, it sure would I had that happen in the prechlorination there on the pad before launch. I had backed off on the nut and instead of just filling up that ampule the water pushed the ampule off the needle and then once its done that the water just goes back around and comes out those two holes.

SC Well, I can't say that didn't happen. The first problem occurred with the chlorine injection.

CAPCOM Right, I didn't see that on the pad.

SC My first problem was when I went to put the chlorine ampule in and at some point in there when I went to take it out I tried to get it in and it didn't look right when I went to take it out it started bubbling all over and I couldn't tell where it was coming from then. And whether it came from those two holes or not that's quite possible. I'm not sure. When I looked at the ampule itself after I opened up the ejector you could see that the bottom lid had broken, the little sliding plug in there.

CAPCOM Once that thing isn't water tight anymore you'll get leakage into that container and that'll all come out those holes.

SC Okay, then perhaps the only problem was the one when the first ampule breaking.

CAPCOM Alright, we'll try to get you a procedure, here and try (garble).

SC Say again.

CAPCOM I was going to say we'll try and get you to agree on a procedure and then go back and try the buffer again.

SC Okay, thank you.

END OF TAPE

CAPCOM Alright, we'll try to get you a procedure here and go back and try --.

SC (garbled)

SC Say again.

CAPCOM I was going to say we try to get you a (garbled)

SC (garbled)

CAPCOM And then go back and try the buffer again.

SC Okay. I guess we can do that.

CAPCOM Okay, hold off on that. We'll get a procedure.

SC Okay, is that something you want to do it tonight or tomorrow?

CAPCOM You want that buffer in there tonight don't you?

SC I don't know. I can't vouch for how much chlorine went in. Perhaps a very little. It's up to the guys who have (garbled) responsibilities. I just can't tell you how much chlorine may have gotten in.

CAPCOM Okay, we understand.

CAPCOM Okay, Ken, I guess we'd like you to take that buffer ampule again and screw the nut down on it so that you think it's good and snug in there and then put it on the adapter and see if it will take the buffer. Before you close it all up again, you might look at the ampule and make sure it hasn't cracked.

CAPCOM Ken, Houston.

CAPCOM Ken, Houston.

SC Go ahead.

CAPCOM Did you get that about going ahead with the buffer?

SC No I didn't

CAPCOM Oh, okay, we probably had some bad comm there. We'd like you to take a look at that buffer ampule and make sure it isn't cracked and if not then go ahead and put it in that little container and screw that nut so you feel it's good and snug and then go ahead and see if it will take the buffer.

SC Okay. How about if I just take a brand new one. Don't we have a couple spares.

CAPCOM Okay, they agree. Why don't you take a brand new one.

SC Okay, and while I'm doing that I'm just looking over the gauges and I know our onboard gauges isn't the greatest thing in RCS. Could you tell me how we stand on RCS?

CAPCOM Okay. I'll get that.

CAPCOM And Ken, at 54 hours you were 2 percent ahead of your RCS budget that's 25 pounds to the good.

SC Okay. Thank you.

APOLLO 16 MISSION COMMENTARY 4/18/72 CST 22:49 GET 58:54 MC-207/2

SC I'll get in a low bias in QUAD A and just - -
kinda looks bad.

CAPCOM Okay. We - - our bias is that you're reading
2 percent low on that.

SC Okay.

SC Okay. Tony, I've got the buffer in and I
noticed a slight little spit when I put it in. That's probably
residual. So I'll wait 10 minutes and then suck it out.

END OF TAPE

SC the buffer in and just a slight little spit when I put it in, that's probably residual. So I'll wait 10 minutes and then suck it out.

CAPCOM Okay, good show.

SC Okay, Houston, the O2 flow high and the cabin is pumped up to 57.

CAPCOM Okay, cut the (garble)

PAO This is Apollo Control at 59 hours 9 minutes. The crew at this time completing the items on their checklist prior to getting an 8 hour rest period. And we had a description from Ken Mattingly of some problems he was having getting the chlorine and buffer injected into the drinking water system. This is done with a syringe type device which injects the chlorine and the buffer alternately through a diaphragm in the waste - in the water management panel of the spacecraft. This is injected through with a hyperdermic needle arrangement. And from the descriptions given by Mattingly and the discussions that he had with CAPCOM, Tony England, it appears that the problem he had was related to the way in which the ampules of chlorine and particularly the buffer are placed in the syringe. They are held in place by the nut that screws down on the ampule and a plunger device then is activated which drives the buffer out of the syringe and into the water supply. Apparently the nut is not down tight enough holding the - which would have allowed the ampule to ride up off the needle and instead of buffer being injected into the water, water was allowed to flow back out and come out of the syringe. Mattingly reported when he followed the procedure outlined by Tony England that apparently the buffer was injected properly and we believe that sufficient chlorine was injected to take care of the requirements there and the plan at this point is to put the crew to bed as soon as possible. At the present time we are showing Apollo 16 178,435 nautical miles from Earth and the speed of the spacecraft at this time 2,891 feet per second. In about 8 minutes Apollo 16 will be crossing the imaginary line designating the lunar sphere of influence. At this point the Moon's gravitational force becomes the dominate gravity force acting on the spacecraft. And here in the control center our displays are monitoring the spacecraft velocity and altitude will switch over from Earth reference which we've been using the bulk of the flight to Moon reference. At that point the Earth will be 178,673 nautical miles from the spacecraft and the spacecraft will be 33,821 miles from the Moon. The velocity of the spacecraft with respect to the Earth at that point will be 2,887 feet per second and with respect to the Moon it will be traveling 3,482 feet per second. The time of that sphere crossing is 59 hours 19 minutes 45 seconds.

END OF TAPE

CAPCOM Ken Houston.
 SC Okay, Tony, got that buffer in and out and all looks normal now.
 CAPCOM Okay. Good show.
 SC Houston, 16.
 CAPCOM Go ahead, Ken.
 SC Okay. Looks like we've got the buffer in and the water back out and everything looks normal now.
 CAPCOM Good show. If you didn't get much chlorine in the buffer, it won't hurt anything, but it would have hurt the other way if you'd put the chlorine in without adding the buffer, so - - Either way, we're in good shape now.
 SC Okay. Then I guess our only problem then was just the fact that I probably broke that first chlorine ampule some way.
 CAPCOM Rog.
 SC Okay, Tony, I guess I'm ready to get a film status report.
 CAPCOM Okay. Go ahead.
 SC Okay, on Magazine Victor Victor, we're on frame 21; Magazine Hotel Hotel frame 85; Magazine Oscar Oscar frame 34; November November is also 34; Juliet Juliet is fifty percent.
 CAPCOM Was that five zero percent?
 SC That's five zero percent - That's affirmative.
 CAPCOM Okay.
 CAPCOM Okay, we've copied all of those.
 SC Okay, I guess we're about ready to sign off. Do you folks have any last words or any questions?
 SC Houston, we're about ready to go to sleep. Have you got any questions or anything you want to tell us before we shut down the Comm system?
 CAPCOM Okay. We're running around here to make sure there's nothing. I just looked through your last system report that came around here and everything looks nominal. Everything really looks great. Okay, I guess - -
 SC - - looks good to us, too.
 CAPCOM Good show. And I guess there's nothing else down here. Would you like me to hum to you?
 SC Tony, even that won't keep me awake.
 CAPCOM (Laugh.) Oh yeah, it would. I'll see ya'll on the moon - - I've got a day off tomorrow.
 SC Good show.
 SC Okay. Sounds good. See you tomorrow.
 CAPCOM Roger.
 SC Good night.

APOLLO 16 MISSION COMMENTARY 4-18-72 CST 23:07 GET 59:12 MC-209/2

PAO This is Apollo Control. While we were in the process of completing those last few items with the crew before saying good night, Apollo 16 crossed into the Moon's sphere of influence, and we're now showing the Spacecraft at an altitude of 33,680 nautical miles from the Moon and traveling at a speed of 3,482 feet per second, and that velocity is increasing. The time again of that sphere crossing was 59 hours 19 minutes 45 seconds. At 59 hours 24 minutes, this is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control at 60 hours 3 minutes. At present time we're in the mist of a shift handover in Mission Control. Our Flight Director Phil Shaffer is coming on to replace Flight Director Pete Frank. The spacecraft communicator on the on coming shift will be astronaut Hank Hartsfield replacing astronaut Tony England. And at present time Apollo 16 is 32 321 nautical miles from the Moon. Traveling at a speed of 3492 feet per second. During this past shift the major activities for the crew included another activation and check out of the lunar module. At 53 hours 28 minutes Duke and Young transferred into the LM and switched over from command module power for that vehicle to the LMS. All power systems, activated communications equipment and completed some general housekeeping activities aboard the LM. They then returned to the command module and all three crewmen donned their pressure garment assemblies less helmets and gloves and Duke and Young re-entered the lunar module checking out the procedures that they'll use the day of the lunar landing for suiting up and ingressing the lunar module. Following this exercise Charlie Duke reported that they had some difficulties when John Young attempted to close one of the large restrain zippers on Duke's suit. And he said when the zipper -- when they tried to get the zipper closed across the small of his back that Young had to exert quite a bit of force to get the zipper to close. Later Charley Duke reported that although he was not concerned that the suit would be comfortable once pressurized, there was some concern that they might have difficulties getting the suit zipped up when he was wearing the liquid cool garment. And this is normally worn under the suits during the EVA's. It was not worn after the exercise tonight and Duke suggested that it might be a wise idea to try - - try the suit with the liquid cool garment underneath to make sure that it would be possible to close the zipper. And he also raised the possibility of lengthing the suit using series of laces which were built into the suit. Now we advised him to leave the problem where it was for tonight and we're going to be looking at it both here in the Control Center and in the Engineering Support rooms in Building 45. Also among our crew systems people and determine what the next step should be. There seems to be no undo concern about the problem here. The feeling was that if the suit fit during the time that it was worn for the launch, that it would fit prior to the lunar landing and the EVA's. However, we will be looking into the problem in more detail and coming up with some recommendations for the crew following their rest period. Also on the list of activities during this shift the crew ran a check of the equipment which will be used in the bistatic radar experiment while in lunar orbit. Transmitting S-band and VHF signals which we'll

PAO receive the VHF signal as was received at Stanford as it will be during the actual experiment in lunar orbit allowing scientist there to calibrate equipment and to determine the precise frequencies that the spacecraft equipment will be operating on. And there were a number of items from the Skylab food which were included in the menu for tonight's dinner. The astronauts were evaluating this food both it's packaging and ease of preparation. They were taking motion pictures and still photos of the preparation and will be providing post flight detailed reports on how this operation went. John Young made the comment that there were very few casualties and no loss of life following the use of the Skylab food. He did comment that it took as he put it a lot longer than they had allowed for. I think the supposition here in the Control Center was that he was talking for about the documentation procedures, the filming and the still photography. And we had one minor problem in the chlorination of the drinking water supply. This is done in two steps. Chlorine is injected using a hypodermic type syringe and this device injects the chlorine through a needle and then through a diaphragm which then allows it to be inter-mixed with the drinking water. This is followed with an injection of buffer and Ken Mattingly reported some difficulty in injecting the chlorine and he said when he checked the ampule which holds the chlorine was broken and he also said that when he tried to inject the buffer that instead of buffer going in, water came out. Tony England, Capsule communicator on this shift recalled having a similar experience prelaunch when he was chlorinating the drink water in the spacecraft on the launch pad. And we very quickly remedied that situation with a recommendation from England that the nut which holds the ampule into the syringe be firmly up against the syringe to permit the ampule from separating from the needle and allowing water to come out rather than buffer to be injected in. Mattingly double checked his procedure and tried again and the second time around reported that everything went as planned with no problem. Also on this shift we crossed this mythical line known as the lunar's fear of influence at which point we begin calculating our spacecraft velocities and altitudes with respect to the lunar module. Also at this point that theoretically the moon becomes the dominant force acting upon the spacecraft from a gravity point of view and the spacecraft begins to accelerate towards the Moon. At that point Apollo 16 was 178 673 nautical miles from Earth and 33 821 nautical miles from the Moon. That event occurred at 59 hours 19 minutes 45 seconds ground elapsed time. At 59 hours 23 minutes or a little less than 1 hour ago, actually about 50 minutes ago, we said good night to the crew and we've heard nothing from them since. They have an 8 hour rest period

APOLLO 16 MISSION COMMENTARY 4/18/72 CST 23:20 GET 59:25 MC-210/3

PAO scheduled. During that time we will take the air to ground line down. We'll be recording any conversations should we have unschedule or unexpected conversation with the crew. We'll play that back following receipt. And we'll be giving periodic status reports. At 60 hours 12 minutes this is Apollo Control Houston.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/19/72 CST 24:45 GET 60:51 MC-211/1

PAO This is Apollo Control Houston at 60 hours 51 minutes since lift-off. We now show Apollo 16 at 30,683 nautical miles away from the Moon. Velocity now reads 3503 feet per second - this velocity relative to the Moon. Phil Schaffer is again the Flight Director for the White Team of Flight Controllers who are now on duty in the Mission Control. As previously reported, the crew of Apollo 16 is in their - is in their sleep period. Right now, we expect that Young, Duke, Mattingly will be allowed an extra hour of sleep, making the wake-up time at 67 hours ground elapsed time. At 61 hours 52 minutes into the Mission, this Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control Houston at 61 hours and 51 minutes into the mission. The crew of Apollo 16 continuing with their rest period as Apollo 16 continues oncourse toward lunar orbit. We presently show Apollo 16 at 28,605 nautical miles away from the Moon, velocity now reads 3,520 feet per second. Very little conversation on the flight directors loop in the mission operations control room. One of the items to be decided on this shift however, is the requirements for midcourse correction number 4 prior to a lunar orbit insertion. If it is decided to do it, MCC4 will be a small maneuver. We are at 61 hours and 52 minutes ground elapsed time and this is Apollo Control, Houston.

END OF TAPE

PAO This is Apollo Control Houston at 62 hours 51 minutes ground elapsed time. Our displays mission control now show Apollo 16 26,522 nautical miles away from the Moon and traveling at a velocity of 3,540 feet per second. Meanwhile in the control center we continue in our systems monitoring mode as the White flight control team continues to maintain their logs and update their planning notes for handover to the next team of flight controllers. The next team will be on duty when the lunar orbit insertion burn occurs. This morning the surgeon is monitoring commander John Young's sleep response. He selects a different crew member each evening and he reports that Young is resting well. We're at 62 hours 52 minutes ground elapsed time and this is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control Houston at 63 hours 52 minutes into the mission. We now show Apollo 16 at a distance of 24, 470 nautical miles from the Moon, and traveling at a velocity of 3,567 feet per second. CAPCOM Hank Hartsfield has not spoken with the crew on this shift yet this morning, however, he will place the wake-up call and the wake-up call is now scheduled for a bit over 3 hours from this time. We're at 63 hours 53 minutes and this is Apollo Control, Houston.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4-19-72 CST 04:45 GET 64:50 215/1

PAO This is Apollo Control Houston, at
64 hours 51 minutes into the mission. We now show the
Apollo 16 spacecraft at 24,237 nautical miles away from the
moon. We've had no contact with the crew of Apollo 16 for the
past hour nor do we expect contact with the crew for a bit
more than two hours. Crew wake-up time is now 2 hours and
8 minutes away. We'll stand by however, and continue
to monitor our conversations within the mission control center and
the various displays. At 64 hours 52 minutes ground elapsed
time this is Apollo Control Houston.

END OF TAPE

APOLLO 16, MISSION COMMENTARY 4/19/72, CST 05:45, GET 65:50 216/1

PAO This is Apollo Control, Houston, at 65 hours 51 minutes into the mission. We now show Apollo 16 a distance of 20,195 nautical miles away from the Moon. and traveling now at a velocity of 3626 feet per second. The crew of Apollo 16 can expect their wake-up call in a bit over an hour. Our down clock at Mission Control shows 1 hours 8 minutes remaining until time of wakeup. The flight plan for the up-coming day of the crew, is essentially unchanged, however, one item is still open, this being the decision on whether or not to do midcourse correction 4. We're at 65 hours 52 minutes ground elapsed time and this is Apollo Control Houston.

END OF TAPE

PAO Apollo Control, Houston at 66 hours 16 minutes into the mission. We now show Apollo 16 at 19,304 nautical miles away from the Moon. and now traveling at a speed of 3643 feet per second. Although, we've had no conversations with them our data here in Mission Control indicates the crew is awake - waking up on their own. We will standby with the air to ground line up to pick up the conversations between the crew of Apollo 16 and Capcom Hank Hartsfield, should it occur. We're at 66 hours 17 minutes ground elapsed time continuing to monitor the Apollo Control, Houston.

END OF TAPE

SC Okay, Houston. The LM fan delta P is about one and the cabin pressure being what it is, I guess that means that we really don't have any leakage up there much.

CAPCOM Roger. Copy. One PSI.

SC PSID, Hank.

CAPCOM Stand corrected.

PAO Apollo Control, Houston, at 66 hours 29 minutes. Apollo 16 is now 18,839 nautical miles away from the Moon, and now traveling at a speed of 3652 feet per second. This is Apollo Control, Houston, continuing to monitor.

END OF TAPE

PAO This is Apollo Control Houston at 66 hours 47 minutes into the mission. We now show Apollo 16 at a distance of 18,243 nautical miles, this is the distance away from the Moon. We now read Apollo 16's velocity at 3,664 feet per second. At 66 hours 46 minutes, continuing to monitor, this is Apollo Control Houston.

PAO This is Apollo Control Houston, 67 hours ground elapsed time. Our displays now show Apollo 16 at a distance of 17,704 nautical miles from the Moon, and we show a speed of 3,676 feet per second. We've had no further communication with the crew of Apollo 16 since that original greeting from spacecraft commander John Young. But we will continue to monitor, and this is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control Houston at 67 hours 10 minutes ground elapsed time. We show the spacecraft Apollo 16, presently at a distance of 17 350 nautical miles away from the earth - away from the moon, and traveling at a speed of 3684 feet per second. Meanwhile in the Mission Control Center, Flight Director Phil Shaffer has just decided that a midcourse correction number 4 burn will not be required. We're at 67 hours 11 minutes continuing to monitor. This is Apollo Control Houston.

SC Houston, how would you like to have a status report?

CAPCOM Okay, we're waiting. Go ahead.

SC You're all 85 foot dishes, right? Ears I mean.

CAPCOM Roger.

SC Alright, Henry. We'll start here on A section. A1 22041, ALPHA 3: 6-1/2, outstanding, ALPHA 4: none, ALPHA 5: 27, and 5, ALPHA 6: 7, 10, and 5. BRAVO 1 BRAVO 1 15039 BRAVO 3, 5 good, BRAVO 4, none, BRAVO 5, 3725, BRAVO 6, 5 and 5. CHARLIE 1, 21075, CHARLIE 3, 6 good, CHARLIE 4, none, CHARLIE 5, 15 and 15, CHARLIE 6, 5 - 5 and 7.

CAPCOM Okay, was CHARLIE 6 just 2 entries 5 and 7?

SC That's affirm. Okay, make that 5 5 and 7.

CAPCOM Roger.

SC And off the gormet seat.

CAPCOM Stand by, Ken. We're coming up on an antenna switch and we'll lose comm for a few minutes.

PAO This is Apollo Control Houston at 67 hours 18 minutes into the mission. What you just heard was Ken Mattingly passing along the crews biomedical report following a convenience format using letters and numbers for speed in reporting. For example, A is the Commander, B is the Command Module Pilot and C is the Lunar Module Pilot. The 6 pieces of data reported on were radiation dosimeter readings, food, this is a negative report when the crew member followed the planned menu, amount of sleep, medication, urine, and water consumed. At 67 hours 19 minutes we show Apollo 16 at 17 033 nautical miles away from the moon and traveling at a speed of 3691 feet per second.

END OF TAPE

CAPCOM 16, Houston. Apollo 16, Houston. Apollo 16, Houston.

SC Okay, go ahead.

CAPCOM Okay. You're out so far now that when we get close to antenna switching we lose COMM there for about a minute and a minute and a half and we're ready to copy the menu now, food.

SC Okay, menu reporter is sealing a cup of coffee. He'll be with you in a second.

CAPCOM Roger and the surgeon compliments the reporter on the way he reads the report down.

SC Yeah, when you've got a college education you learn to read boy anything that happened after that.

SC Okay, Henry. The Happy Gormet says that the Commander well we'll start with meal A. And on the Commander you can delete the grits. On meal B we skipped (garble) for meal B and then ate it at meal. And on that we skipped the peanuts. And for the second meal on the day, John had a grapefruit drink, bread with peanut butter, and I guess that's it.

CAPCOM Okay.

SC Okay, on mine you can start on meal A scratch the peaches, the scrambled eggs, four bacon squares, grits. My meal B, I had the bread and peanut butter, and the grapefruit drink. On Skylab meal, I had one of the two rye breads and on all this chicken spread no one ate a third of it - we probably ate a tenth a piece. And for Charlie he's been good. He eats everything. None of us ate the peanuts on the Skylab meal. And for the second meal of the day Charlie had an orange-pineapple drink with potassium and peanut butter. And you'll be happy to know that we shared our peaches with Casper. He ate just about as much of them as we did.

CAPCOM Roger. Copy. That sounds kind of like it didn't work out too well.

SC There's a lot of peaches still on Casper's face I'll tell you that. Like when you open that can you get them all at once.

CAPCOM Charlie you're going to have to work on those guys about the grits.

SC Grits are good. I can't get them to eat them though. They - I sure ate part of John's. Okay Hank and maybe I missed it here somewhere but could you give us some words on what you plan to do about midcourse 4.

CAPCOM Okay, no midcourse 4 and I've got a couple items of news here, if you are interested in that.

SC Okay is that general interest news or like how we handle our relay setting and so forth.

CAPCOM Oh, it's just general interest stuff. We're coming up on antenna switching.

SC Okay, we'll catch you after that.

APOLLO 16 MISSION COMMENTARY 4/19/72 07:14CST 67:19GET 221/2

PAO This is Apollo Control Houston, 67 hours, 27 minutes into the mission. As you heard the crew of Apollo 16 sounds fresh and ready this morning. The principal spokesman for the crew thus far has been Ken Mattingly who provided the status reports. We show Apollo 16 at 16,736 nautical miles away from the moon. We now show the velocity of Apollo 16 at 3699 feet per second. At 67 hours 28 minutes continuing to monitor this is Apollo Control Houston.

END OF TAPE

CAPCOM 16, Houston.
SC Houston, you up yet?
CAPCOM Okay, 16, how do you read?
SC Okay, Henry. How about if we stop PPC
right here at this 144 degree pass?
SC Henry, did you copy that?
CAPCOM Roger, we copied and we got some flight
plan updates for you and you can stop it now if you like.
SC Okay go ahead.
CAPCOM Okay, repeat no end CC4's required and
for your information the data there for the UV photos is good
for an hour after the flight plan time. So there's no real
rush on that one. If you're ready to copy we'll just charge
right into these flight plan changes. The first one is at
70 hours and --
SC Okay go.
CAPCOM 70 hours and 40 minutes. We want to write
in there, "Charge Bat A", and that's for your information for
about 3 hours and 20 minutes.
SC Okay. At 70:40 we'll charge battery A
and that's roughly going to be in 3 1/2 hours.
CAPCOM That's affirmative. And at 71:20, we
want to enter load DAP with the weights and gimbal trim from
MSFN. And call EMP 509.
SC Okay at 71:20 we'll load the DAP with
MSFN weight (garble) gimbals and call EMP 509.
CAPCOM That's affirmative. The next thing occurs
at 73:55, at the sextant star check -- want to add in
parenthesis no VERB 41, manually -- manual only with VERB 16
NOUN 91.
SC Okay. I've got at 73:55 at the sextant
star check we'll do no VERB 41 and we'll do it manual with
16 91 as our check.
CAPCOM That is affirmative and E COM advises
you can --
SC While we're on that, Henry, -- while
we're on that one, Henry, I didn't see where we've terminated
509. Do we keep running it all this time?
CAPCOM That is affirmative.
SC Thank you.
CAPCOM Okay. And EECOM advises you can go ahead
and start that battery charge now if you want to get Charlie
started on that. And the next thing that occurs at 74:08. And
there we do the DOO SPS cue card through gimbal drive.
SC Okay, that's at 74:08. It's SPS cue
card through gimbal drive.

APOLLO 16 MISSION COMMENTARY 4/18/72 CST 7:22 GET 67:28 222/2

CAPCOM Roger and LOS -- MSFN LOS time will be
74:18.

SC Okay, 74:18 is LOS.

CAPCOM Okay, that's the flight plan changes.
I have some notes now. I don't know where's the best place
to copy these. I've got about 9 or 10 of them here. Well,
I'll take it back. I have two notes on the use of EMP 509
and they read as follows.

SC Okay, let me get my scratch pad out and
then I'll copy those first.

END OF TAPE

SC Okay, Henry. I'm ready to copy your notes.
CAPCOM Okay. Number 1, the TVC-DAP, is unstable with
EMP 509.
SC Okay, understand the TVC-DAP is unstable with
590 running.
CAPCOM That is affirmative, and number 2 is at SPS cut-
off, plus 2.5 seconds, the TVC-inable is de-energized. The EMP is
off. Thus, the platform alinement could be lost.
SC Okay.
CAPCOM Okay, and I have some flight plan changes now
that are concerned with DOI. The first one occurs at 7 --
SC Stand by a second.
SC Okay, Henry. I'm ready. These are comments or
these are things to go into the flight plan.
CAPCOM Roger. These are flight plan changes, Ken. I'm
sorry I didn't get this in order a while ago. It was buried in the
bottom here.
SC Okay, go ahead.
CAPCOM Okay, at 77:57, there's a group of CSM systems
check. Move those up to 77:20.
SC Okay, we take the CSM systems check and move them
from 77:58 over to 77:20.
CAPCOM That's affirmative. Now at 77:50, VERB 48 21101
01111.
SC Okay, at 77:50 that's VERB 48 21101 01111.
CAPCOM That's affirmative, and immediately following
that start EMP 509.
SC Okay, Henry. I guess I don't quite under-
stand the loading the, the VERB 48 21101, and the next thing we do
is load a 3 in there. Could you have someone give me some rationale
on that.
CAPCOM The difference there, Ken, is you. Once when
your loading that VERB 48 for the EMP 509, you don't pull on that
one and activate that DAP.
SC Okay, I see what you're saying. All right.
CAPCOM In other words, we have to get the right DAP in
there before we do the EMP 509. The next item is the activities that
are located between 78:03 and 78:08, we want to move back to just
following to P52 at 77:53.
SC Okay. How about giving me the first line and
last line on the block your talking about.
CAPCOM Okay, that's P30, verify DOI TIG and Delta-V's
through acquire MSFN OMNI D. Move all that back to just following
the P52, or landing site orient at 77:53. And in that group of
activities, we want to delete that VERB 48.
SC Okay, now what I have is - hey, do you have any-
more changes to this area and then I'll read you what I have sequencelly.

CAPCOM There's nothing more on that particular page, 77 through 78 hours.

SC Okay. Maybe I missed something here, but I have not seen this terminate 509. I'm sure we did somewhere before the LCI burn and we'll do it again.

CAPCOM We're going to get to do, on that, Ken, we're going to have that on your cue card. I'll got a cue card change coming up for you.

SC Okay. All right, let me give you what I have here then. At 77:20 I do all of the CSM systems check list items that are listed now at 77:58. At 77:50 we do a VERB 48 21101 01111. We start the EMP 509. Then at about 77:55, we do all of the step which are presently listed at 78:03 down through 78:08.

CAPCOM And that's with the exception of the VERB 48.

SC Yes, that's right. With the exception of VERB 48.

CAPCOM Okay.

END OF TAPE

CAPCOM Okay, that's all correct. Now, the next item is at 78:22 we delete the sextant start-check and move it back to 78:15. And it carries the same warning as we had before. No VERB 41, manual only with the VERB 16 NOUN 91.

SC Okay, add the sextant start-check at 78:15 with no VERB 41 doing it manually and deleting the start check at 78:22.

CAPCOM That's affirmative and the last item for this is at 78:18 add do SPS cue card through gimbal drive.

SC Okay, at 78:18, do SPS cue card through gimbal drive.

CAPCOM Roger, and the cue card that you'll use is the same for LOI and DOI. We're going to read you those changes.

SC Okay.

CAPCOM 16, Houston. I have your SPS burn card changes whenever you're ready to copy.

SC Go ahead.

CAPCOM Okay, just as a note here for yourself, you load the dap before starting the card, and you do not change VERB 48 after starting E and B 509. We tried to indicate that in the flight plan, and I explained that to you awhile ago. Okay, first step. At the top of the card, the very first item, add E and B 509 called.

SC Okay, at the very top of the card, it's E and B 509 and called.

CAPCOM Roger. And down the 5 item where it says load DAP, delete that.

SC Okay, we'll delete both DAP's.

CAPCOM Where it says (garble) sextant start check, delete the VERB 41 NOUN 91 enter and make the comment: no VERB 41, Manual only with VERB 16 NOUN 91.

SC Okay, we delete VERB 41 NOUN 91 and we say no VERB 41, manual VERB 16, NOUN 91.

CAPCOM That's affirmative. At the left of the card opposite main bus ties, where it says 54 minutes, change that to 40 minutes, and in parenthesis minus 20 minutes.

SC Okay, we change 54 minutes to 40 minutes and minus 6 to minus 20.

CAPCOM Roger, and down a little further where it says 55 and 5, we want to change that to 41 and minus 19.

SC Okay, we've changed 55 to 41 and minus 5 to minus 19.

CAPCOM Okay, on the backside of the card. Let me read you the whole thing I want to get in there, Ken. So you'll know how to squeeze it. Right after it says ACCEPT parenthesis pro, we want to get in there, if glitch occurs, use RHC to stop manuever, VERB 23, NOUN 20 enter enter, NOUN 40 enter, VERB 62 enter, manual manuever to attitude so you've got to kind of squeeze that in there a little bit. I'll read it to you slowly now. If glitch occurs -

SC Okay, stand by a minute.

SC Okay, go ahead Hank.

CAPCOM Okay, if glitch occurs, use RHC to stop manuever. Verb 23 noun 20 enter enter, verb 40 enter, verb 62 enter, manual manuever to attitude.

END OF TAPE

PAO Apollo Control Houston 67 hours 50 minutes into the mission. We're listening to CAPCOM Hank Hartsfield pass along flight plan updates to the crew of Apollo 16.

SC This is - this is after the pro on - gimbal test and we're saying that if you get one of these glitches, let's use the RHZ to stop the rates. With the medium objection to just switching to SCS, while we do the rest of this and that's my question. Now I'll read on VERB 23 NOUN 20 ENTER ENTER and I have a question there and I got the impression from what we have seen in our previous discussion that this wasn't restricted just to the middle gimbal - it's a possibility for the others. And then a VERB 40 ENTER which will release the platform. VERB 62 will take us back. It's not clear to me once we've put in NOUN 20 as 0, that VERB 62 is a useful number. It seems to me that I must have skipped something here.

CAPCOM Okay, I am a little puzzled about the VERB 62 needles. However on the other item, the reason you only need a VERB 23 is that the - that zeroes that CDU which is the only one that locks you up in course a line and the others will reinitialize when we do the VERB 40.

SC Okay, I guess my question though is - if it can happen in each of them, the only time you do the VERB 23 NOUN 20 would be in the event that it did lock into the course a line.

CAPCOM That's affirmative. Data was just saying you cover all bets when you do this. You don't have to stop and think about it.

SC Okay, but if you had moved off in yaw, it seems to me it would be possibly introducing more air.

PAO Apollo Control Houston, 67 hours 53 minutes into the mission. Apollo 16 now 15,800 nautical miles away from the moon and now traveling at a speed of 3723 feet per second. Continuing to monitor, this is Apollo Control Houston.

CAPCOM Ken, would you state your concern again so we've got a clear picture of it.

SC Okay, maybe I'm off on a tangent. What it looks to me like is that if you pick up one of these glitches, I'm not sure that the rates are all going to be confined to just one axis by the time it stops, and if you then take and load register 3 and NOUN 20 to zeroes, you may, in fact, be at some other middle gimbal angle than 0. So once you do that - I guess that - that has no effect if I do a VERB 40, huh? I guess that's - I guess I missed that point. That merely gets me out of the course a line. That VERB 40 was initialized. Is that correct?

CAPCOM That's affirmative. The VERB 40 starts the whole thing running again.

SC Okay.
CAPCOM The VERB 23 NOUN 20 gets you out of the gimbal lock, if that's the case.
SC Okay. Now I'm with you. I guess the only other thing is that in the event that we have the thing that happened the other night and it did course a line there - it seems to me that before I do the VERB 40 I would want to fly back on SCS to zero middle gimbal angle, is that correct?

CAPCOM That's affirmative.
SC Okay. Okay, I think I understand that, thank you.

CAPCOM The concern over using the SCS, Ken, was that they were afraid you would introduce a transient - another transient in there by the switching. However, if you can't do - can't null it out with the R&C, you might be forced into SCS.

SC We're sure going to try. Perhaps once I just get the hand controller out of D pin it'll stop, and then whatever new additive it has, that ought to hold it, so there may be no further intransients. I'll try that first.

CAPCOM Roger. Are you ready to go on the changes?

SC Yes sir.

Capcom Okay, out to the side there - a little arrow I guess the best way to indicate - in other words, between rate high and EMS normal, we want to say terminate EMP 509.

END OF TAPE

SC Okay, when I terminate the EMP 509, do you want me to write that between rate high and EMS to normal? And it looks like the -- I would do the VERB 48 back to my original values, but it looks like I would not be resetting the average deflect. Or do you want that reset anyhow?

CAPCOM Standby, Ken.

CAPCOM Ken, the map suggests to do a normal terminate as on the procedure they read up to you and that's after you finish the gimbal drive checks. That's what it's associated with. And following that -- the next item -- just prior to 59 minutes -- I don't know how you're going to get all of this in there you may have to write it to the bottom and show an arrow. At minus 6 minutes tape recorder high bit rate record for command reset.

SC And he did not want to do that at minus 20?
Is that affirmative?

CAPCOM That's affirmative.

SC Do you want me to delete that from minus 20?

CAPCOM Yes, I omitted that, Ken, I was going back to that -- back over here at minus 20 we want to delete -- scratch through tape recorder high bit rate for command reset. And for your info. The reason we've given this 20 minutes is in both LOI and DOI that gives us about 10 minutes to watch what you're doing, watch the gimbal drive check and if you need any help we can give it to you from down here.

SC Okay, that sounds like a good plan.

SC Okay. You want the tape recorder on at minus 6 minutes.

CAPCOM That's affirmative.

SC Okay. Go ahead.

CAPCOM Okay. Following 00XX ECO enter right in there be prepared for SCS takeover.

SC Okay, I got that.

CAPCOM You ready for the next one, Ken?

SC Yes, go ahead.

CAPCOM Okay. Right after TVC servile power 1 and 2 off, we want to enter a little comment that says prior to trimming NOUN 85, NOUN 20's should be checked against the IMU.

SC Okay after TVC servile power 1 and 2 off and we'll put a note here that says prior to trimming NOUN 85 check NOUN 20 against IMU and that's going to read from different angles off the FPAI pickoff.

CAPCOM That's affirmative.

SC Okay.

CAPCOM
bar rules card.

Okay, now I have changes for your SPS

SC
on here.

Standby. Let me read back what I've got

CAPCOM

Go ahead.

SC
a note. Can you read me all right?

On the SPS card, starting at the top with

CAPCOM

Roger.

SC
a note that says no VERB 48 changes after entering 509. The first step on the card is EMP 509. I have deleted most of that. Under the foreside sextant star check I have deleted VERB 41 NOUN 91. I've replaced that with a note that says no VERB 41 and use manual monitor 1691. I have changes the bus tie on time from 54 minutes to 40 minutes and that changes minus 6 to minus 20. I have deleted the tape recorder line at minus 6 minutes. I've changed the time 55 to be 41 minus 5 to be minus 19 and that's all the changes I have on the front side of the burn card. On the back side next to the proceed after the gimbal test option. If the -- if we get a glitch, it's RHC to stop rates VERB 23 NOUN 20 enter, enter, VERB 40 enter, and then VERB 62 enter, manually maneuver to attitude. After rate high, and before 59 minutes, terminate EMP 509. At minus 6 minutes, tape recorder goes to high bit rate record for the command reset. At 00XX, an engine cutoff, it's prepared for SCS takeover. At TVC servile power 1 and 2 off, we've added a note, prior to trimming NOUN 85 check NOUN 20 against the IMU. And that's all the comments I have on the burn card.

END OF TAPE

CAPCOM That's a good readback, Ken and just to reiterate that, terminating E and B 509 is associated with terminating the gimbal test or ending up on that.

SC Roger. I can do that anytime after the gimbal test is completed?

CAPCOM That's affirmative.

SC Okay.

CAPCOM We'd prefer that termination right after the gimbal check.

SC Yes sir, don't want to get caught too late doing that. Okay, Houston. This procedure, it'll handle no matter what glitch we get, and I understand that. But how about some discussion of the probability of getting such a glitch. Is there anybody thinking about that much, down there?

CAPCOM I guess all of us have been thinking about it, John, but there is just no way we can predict whether it will happen again, or not. I got thinking on the thing again, we'll probably never see it again.

SC Understand. It's very similar to the kind of thing that we had happen back in the early part of the Apollo program with the CDU's that would make them count different. Is that not correct?

CAPCOM That's affirmative.

SC Okay, thank you.

SC Houston, 16. Ready to copy the SPS burn rules update.

CAPCOM Okay, the reason for these changes Charlie is after we watched MC6 and looked at the system pressures there, we got some new data, and for your information, we're kind of predicting that your nominal values are going to be oxidizer 200, fuel 170, for your onboard readings. So based on that, we need to change these burn rules. And I believe you've already made one change to it, is that correct?

SC Yes, but we got - I can scratch it in again somewhere else.

CAPCOM Okay, on the fuel oxidizer press, where you put in 124 oxidizer, we want to change that to 138 oxidizer, and the fuel goes from 110 to 112. In other words, instead of 124 OX, 110 fuel, we want 138 OX, 112 fuel.

SC Okay, copy. Go ahead.

CAPCOM Okay, for your fuel oxidizer DELTA P, the new rules are: oxidizer greater than fuel by 50 to oxidizer greater than fuel by 12.

SC Now wait a minute, I had 50 OX less than fuel last time.

CAPCOM Okay, but what you had before, I think was 35 and 5, is that correct?

SC Oh, okay. You're right, 35 and 5.
Okay, go ahead again now.

CAPCOM Okay, the new ones become 50, oxidizer greater than fuel to 12 oxidizer greater than fuel. In other words, your 35 and 5 rules go to 50 and 12. Both of them, though, oxidizer greater than fuel. What we're changing is the 35 to 50 and we're changing the 5 to 12 and changing the sign over there, oxidizer greater, instead of oxidizer less.

SC Okay, what you're telling me, that's the limit, 50 oxidizer greater than fuel can be as high as 50 or as low as 12.

CAPCOM That's affirmative. Oxidizer greater than fuel in both cases. In other words, your range is oxidizer 12 to 50 psi greater than the fuel pressure. Okay, and on your tight limits.

SC Okay.

CAPCOM Change the oxidizer to 168 oxidizer. What you have there is 168 oxidizer, 153 fuel, want to change that to 183 oxidizer, 153 fuel, no change in the fuel.

SC Okay, copy. Tight limits, oxidizer has to be greater than 183 and fuel greater than 153.

CAPCOM That's affirmative.

SC Okay, Hank. Let me give you an example here on this DELTA P. Right now I'm looking at about 170 fuel and 195 oxidizer. That says that I can go to - down to 150 - 140 on the fuel side with a constant oxidizer pressure before I reach my limit, or have the fuel pressure increase up to 178 before I reach my limit. Is that correct?

END OF TAPE

CAPCOM J. G. checking. Let him look at it, Charlie.
SC Okay.
PAO This is Apollo Control. Shift handover under way in the control center here, with Gerry Griffin's gold team taking over. There will not be a Change of Shift Briefing this morning from the off-going shift. Repeat, there will not be a Change of Shift Briefing.

CAPCOM - oxidizer followed Delta-P at 12. That was the answer I got back on that, however, on the example you gave I thought you were right with it, except on the second part. It looked like to me you need a 12 difference there. I might have misread the thing.

SC Okay, Al, just looking at my gauges here, I've got about 190 oxidizer pressure, and about 165 fuel pressure, and for that test to meet a fuel (garble) it could go up to 178 and I would still be within the limit.

CAPCOM That's what the rule's say.
SC Okay.
CAPCOM The oxidizer could drop to 177.
SC Roger.
CAPCOM Rog.
SC Hank, could we happen to get a SPS press light along with, still be with limits on these rules.
CAPCOM Stand by.
CAPCOM Their checking their cal-cards now. They're going to call an answer on that.
SC All right, thank you.
SC Okay, Houston. Pressure equalization valve is coming open (garbled) pressure.
CAPCOM OMNI Alpha, 16.
CAPCOM 16, G&C advises to use the pressures and not the light in regard to the burn.
SC Rog. I'm just wondering if I'm, should expect to see it?
CAPCOM That's affirmative. You may. We think the light will come on at 202 oxidizer pressure and we're predicting you're going to be running around 200.
SC Houston, would you like to have the HIGH GAIN antenna?
CAPCOM That's affirmative. Flight plan angles, Ken.
SC Okay, Houston. The pressure equalization valve is closed. The CM Delta-P is 2 tenths now.
CAPCOM Roger, copy. 2 tenths.
SC Yea, I think that 2 tenths is what it reads, and what ever it's equalized.
CAPCOM Roger, that's true.
CAPCOM And 16, also would like to advise that on the tight limit your within 2 PSI on the low pressure side for the fuel.
SC Okay.

END OF TAPE

CAPCOM Okay.
CAPCOM And 16, I have your PLSS engine plus 2 block data.
SC Okay, why don't you just stand by on that and let us get these photos out of the way.
CAPCOM Will do.
SC Hey, Hank. Charlie just noticed that we're in this moon photo additive, and it looks like the sun is just very, very close to being on our line of sight, and it looks like we have one of the changes. We've gone in and opened some of these settings. Could we get a verification that this is the right setup? We can't look out the window very well and tell you if we're aboard sitting on the moon.
CAPCOM Roger, Ken. This is a correct attitude. We'll take another quick scan of the settings. 16, Houston. Would you attempt to bring up the HIGH GAIN.
SC Okay, you've got reacting now. How does that look?
CAPCOM Looks good, Charlie, and in regards to the photos, the PR says the sun will be very close to the moon, but it shouldn't be in the field of view of the camera. The settings are good.
SC Okay, we'll take them as is.
CAPCOM Hey, Charlie. I've got a message for you. Consolidated Jackpines is way up.
SC Great, thank you.
SC So is Charlie.
CAPCOM 16, Houston. I'm, we're going to do the change over now, and I'll see you later on this evening.
SC Okay, Hank. Thank you sir.
SC Yes, you all go get some rest. It will be a busy day later on.
CAPCOM They're already on the way.
SC Hello there.
CAPCOM Hello there. Wanted to advise you that you can relax now. You're in good hands now with the gold team.
SC Understand the gold team is (garbled).
SC Houston, 16. I'm ready for the block data update.
CAPCOM Say again 16. You're very weak.
SC Yea, that's because my mike is about 25 inches away. How's that?
CAPCOM That's a lot better, Johnny.
SC Okay, I'm ready for the block update.
CAPCOM Roger. Okay, Charlie, it's PER plus 2 SPS
G&N 66 363.
SC Wait, hold up on them, hold up on them, Pete.
CAPCOM Okay.
SC Okay, I was on the P37. This is the P30 pad?

CAPCOM This is your abort pad. PER plus 2 abort. It's a P30 load.

SC Okay, go ahead.

CAPCOM Okay, it's PER plus 2 SPS G&N 66 363 plus 121 minus 014 076 26 14 49. NOUN 81's plus 21337 plus 11233 minus 21781 335 116 018. Rest of the pad is NA. Ullage none. Under other, number 1 docked maneuver. 2 based on LOI REFSMMAT 3, gimbal angles on PTC REFSMMAT, roll 263 PITCH 017 YAW 310.

END OF TAPE

CAPCOM 3, gimbal angles on PTC REFSMAT are ROLL 263
PITCH 017, YAW 310.

SC Roger, Pete. 30 pad pericyynthion PER plus 2,
SPS G&N 66, 363, plus 121 minus 014 076 26 14 49 plus 21 337
plus 11 233 minus 21 781 335 116 081 correction 018. Rest of
the pad is in A. Ullage is none. The dock maneuver based on
the LOI REFSMMAT. ON the PTC REFSMMAT the gimbal angles are
263 017 and 310.

CAPCOM That's affirmative, Charlie, and the YAW is
018.

SC That's affirm, 018.

CAPCOM Okay. You can go ahead, no sweat on the
alert.

SC Roger. Just going to let it time out.

CAPCOM Okay, you can go ahead and torque them.

SC The torquing angles?

CAPCOM Roger got them, you can go ahead and troque
them.

SC Okay I'll torque them in 39. That sure is
a mighty super little platform, isn't it.

CAPCOM Yes, second to a sweet.

SC Houston, 16.

CAPCOM Go ahead, 16.

SC Okay Pete, how about giving us a little
recap on midcourse 2 burn as far as what you all saw as chamber
pressures and interface pressures and how does the old SPS
look versus the calibrations?

CAPCOM Roger. Standby. We'll get it for you.

CAPCOM 16, Houston. I've got the figures on this
burn that you wanted and I guess I can start out by talking
about the meter biases to make sure that we're clear on that.
There is a 15 psi bias on the oxygen tank pressure. It is
reading high. On top of that there is a meter bias of 8 psi
which is also high so that our total bias on the oxygen onboard
pressure reading is about 23 psi high, oxidizer, I'm sorry.
And on the fuel it's seven low total which is a meter bias.

SC Okay.

CAPCOM Okay, then with those numbers in mind the
chamber pressure during the burn was 100 psi and the numbers
that you should have read onboard prior to the burn were
oxidizer tank pressure 205 and fuel tank pressure 177 and
after the burn the numbers you should have been reading were
197 oxidizer and 170 fuel. In other words, they both dropped
well, fuel oxidizer dropped 8, and fuel dropped 7 psi during
the burn. The interface pressures preburn were oxidizer 184
and fuel 187 and during the burn they were at 168 oxidizer,
172 fuel and after the burn the interfaces were oxidizer 174
and fuel 179.

END OF TAPE

SC Okay, we understand.

CAPCOM Okay, then with those numbers in mind, the chamber pressure during that burn was 100 psi and the numbers that you should have read onboard prior to the burn were oxidizer tank pressure 205 and fuel tank pressure 177 and after the burn the numbers you should have been reading were 197 oxidizer and 170 fuel. In other words, they both dropped - well oxidizer dropped 8 and fuel dropped 7 psi during the burn. The interface pressures preburn were oxidizer 184 and fuel 187 and during the burn they were 168 oxidizer, 172 fuel. And after the burn the interfaces were oxidizer 174 and fuel 179. All those look good to us.

SC Roger. We got you.

CAPCOM Okay, I don't know whether you noticed your pressures during the burn. It was a pretty short burn, but the oxidizer tank should have read about 205 and the fuel tank about 175 during the burn.

SC Charlie was watching them.

CAPCOM Okay.

SC Okay, Pete. During the burn, when the engine came on, the pressure started down.

CAPCOM Roger, that's what should have happened. It was at 205 and 177 preburn and went to 197 and 170 post-burn. That's oxidizer and fuel respectively.

SC Okay, that's what we saw.

CAPCOM Roger, and I've got to say that's - the figures look real good to them. That's the kind of performance they expected.

SC Okay, now for LOI, when the engine comes on, the helium valves open and I can expect the pressures to rise and my gauge reading for oxidizer to sit around 200 and for fuel to be around 175?

CAPCOM That's 200 on oxidizer and around 170 on fuel, John.

SC Okay, fine.

SC Houston, Casper.

CAPCOM Go ahead, Casper.

SC Could you have somebody put a few words together for me on what happens if the IMU gets course aligned while average D is still on. I'm thinking about at the end of the burn.

CAPCOM Okay, you're wondering about the situation when - if you get the glitch after the burn but while average D is still running?

SC Yes sir, there's no change of terminating average D before that happens and I'd kind of like to have some idea of what I might expect the navigation to do.

CAPCOM Roger, we'll get you an answer on that, Ken.

APOLLO 16 MISSION COMMENTARY 4/19/72 CST 9:13A GET 69:19 231/2

SC Thank you, sir.
CAPCOM 16, Houston. Can you check for us and let
us know whether Ken is on the biomed?
SC Go ahead.
CAPCOM Is Ken on the biomed? We're getting
some strange readings? Could be a loose sensor.
SC It's pretty loose now, it's in my
pocket.
CAPCOM It's in your pocket? That might account
for it.
SC I'm not ignoring your - Yes, I'm not
ignoring it, I just haven't had a chance to stop and put
it on yet. I'll get to it first chance I get.
CAPCOM Roger. That's fine.

END OF TAPE

SC Houston, over. This is 16, over.
CAPCOM Go ahead.
SC How's your BIOMED look now?
CAPCOM Stand by a minute. We'll look. We're still getting a noisy signal on the BIOMED, 16.
SC Okay, Houston. We're maneuvering to the SIM bay door jet attitude now.
CAPCOM Roger, covered.
SC Don, how do you read me now?
CAPCOM Read you loud and clear. Yea, we copied your maneuver.
SC Okay. Rog, I had to switch back to the (garble) the light switches just isn't working out.
CAPCOM Roger.
SC Okay, we're going through the SIM door jet check list and I've got here a list of verifies and on page 1-7 step 10, and it has SMAC power on it, and we haven't been on it. With your concurrence, I'll go ahead and turn it on now.
CAPCOM Stand by one.
CAPCOM Okay, Casper, you can go ahead and turn the power.
SC Thank you sir. Houston, I'm ready to put the pan camera power on the power.
CAPCOM Okay, 16. Stand by a minute. Casper we don't have any pan camera data yet.
SC Okay, I have't put the power on yet. The check list says to stand by for mission in cue. We have the data system on, the OPTS TV is SCI and we have SMAC power on. Pan camera switches are in stand by and off.
CAPCOM Okay, Casper. You can go ahead and turn the power on and we'll cue you when to go to boost.
SC Okay, powers coming on on mark. Barber poles good. Back to gray.
CAPCOM Roger, have it. Okay, Casper. You're go for pan camera to boost.
SC Okay.
PAO This is Apollo Control. Coming up on SIM bay, our scientific instrument module BAY DOOR JETTISON, in about 10 minutes -- 14 minutes, that is. Present velocity is 3,872 feet per second every increasing, relative to the moon. The current height altitude 11,618 nautical miles. Standing by for the SIM bay door jettison.

END OF TAPE

SC Okay, Houston we go for SIM DOOR JETTISON
over.
CAPCOM Stand by.
SC Okay.
CAPCOM 16, we're standing by to arm the SIM power
buses.
SC Okay, I was going to hold up on that. I'll
go ahead and give you a logic power to jettison at this time.
CAPCOM Roger.
SC Here comes logic power jet 1 jett jet number
2, jett.
SC Okay, they're armed.
CAPCOM Roger, we saw them armed. We're go for door
jett.
SC Okay, understand GO for DOOR JETT.
CAPCOM That's affirmative.
SC Thirty seconds to door jett.
CAPCOM Roger, thirty seconds.
SC 10, 9, 8, 7, 6, 5, 4, 3, 2, 1 JETT. There
it goes.
CAPCOM Roger.
SC Okay, the door went. I don't think anything
changed much from what we could tell.
CAPCOM Roger. Got it.
PAO This is Apollo Control. The SIM bay door
referred to by someone on Apollo 15 -
SC We can watch it spinning, out both the center
window and Charlie's window, and it's quite a sight everytime it
comes around, the bright side front really flashes.
CAPCOM Roger.
PAO SIM bay door was referred to by someone on
Apollo 15 as the world largest lens cap. At the time of jettison,
the spacecraft was 11,142 nautical miles out from the moon,
approaching at a velocity of 3,896 feet per second.
SC Okay, Houston that was a pretty good bang.
CAPCOM Roger.
SC The reason it was is on account of we're
standing around here in our underwear, you know. That is
helmets and gloves off.

END OF TAPE

SC I guess the sound of it was about half of what you hear when the - when you're in the LM and the CMP's in here and he hears the pressure reg - the pressure relief valve closed on him.

CAPCOM Roger.

SC The cabin repress valve, that is.

SC Okay, Don. All of the SIM bay configurations have been completed if you want to take a look at the data and see if there is anything that looks funny to you, I can recheck it.

CAPCOM Okay, Casper. Stand by 1 and we'll take a look.

SC Okay, and we're going to P52 attitude now.

CAPCOM Roger, copy. P52 attitude.

SC Okay, the door is rapidly receding from us, and it's certainly hard to tell how far away it is, but it's plenty far away, certainly no recontact problem.

CAPCOM Roger, counted. And Casper, the SIM bay looks okay.

SC Roger, thank you.

SC That's a good start. And, we used only about 15 percent, we're reading magazine bb, 85 percent remaining.

CAPCOM Magazine BB 85 percent.

SC Houston, 16. Our LM CM DELTA P is .2 and the pressure equalization valve is open. Our cryo systems are configured.

CAPCOM Roger, copied. LM CM DELTA P .2.

CAPCOM 16, we've got an LOI preliminary pad and if you'll go ACCEPT, we'll uplink data.

SC Okay, going to ACCEPT.

SC Houston, 16. Go ahead when you pad.

CAPCOM Roger, 16. It's LOI preliminary, SPS G&N 66314 plus 121 minus 014, 074, 282563 minus 27808 minus 02197 minus 02522, ROLL is all zips, PITCH 001, YAW is all zips. Noun 44 is 01700 plus 00583, 28008,614, 27935, sextant star 16, 2429, 271. The rest of the pad is NA, set stars Sirius and Rigel 132, 196, 006, ullage none, other LM weight 36, 287, single bank burn time 628.

END OF TAPE

SC Okay, Houston. On the P30 pad read-back, preliminary LOI SPS G&N 66314 plus 121 minus 014 074 282563 minus 27808 minus 02197 minus 02522000001000 01700 plus 00583 28808 614 27935 162429271 Sirius and Rigel 132196006. No ullage. LM weight 36287 single bank burn time 6 plus 28.

CAPCOM Charlie, let's check Delta-VT. It should read at 28008.

SC Okay, 28008. Thank you.

CAPCOM Roger, that stands correct.

CAPCOM 16, you can have the computer and back to block.

SC Roger. Back to block, Houston.

CAPCOM Roger.

CAPCOM And Casper, Houston. We haven't forgotten your question about what happens if the glitch occurs while average G is running. We're still putting together a nice neat summary for you and we'll come up with it later.

SC Okay, and I guess it's to tell us what the residuals are doing more than anything else and we'd like to know that.

CAPCOM Okay.

CAPCOM 16, we're still seeing intermittent data which indicates that one BIOMED sensor is probably loose on the CMP.

SC Okay, Houston. You've been looking at John's BIOMED; Ken's getting suited up right now with his. Okay, which one is it, CPN or heart rate, over.

CAPCOM It's EKG, John. 16, you can terminate battery A charge.

SC Okay.

SC Houston, Apollo 16, over.

CAPCOM Go ahead, 16.

SC Okay, in a minute and 40 seconds, the (garbled) problem 100 to 101.1.

CAPCOM Roger, we copy and -

SC It's close to a hundred.

CAPCOM THE CNC says it's okay.

SC Sounds good to us too.

CAPCOM All right.

PAO This is Apollo Control and 70 hours 51 minutes into the mission of Apollo 16. Countdown clock showing 3 hours 26 minutes remaining until the spacecraft passes behind the moon. At the start of the first lunar revolution, with lunar orbit insertion maneuver taking place shortly thereafter. The preliminary data passed up to the crew by the spacecraft communicator a short time ago. As the ignition time for the lunar orbit insertion burn at 74 hours 28 minutes 25 seconds. This is subject to some refinement. Probably within a few seconds as we get down to the final maneuver information which will be passed up about, here comes a voice.

CAPCOM Voice check.

SC Roger, we're still here.

CAPCOM Roger, loud and clear.

PAO The final maneuver pad will be passed up to the crew at about 73:20, and at the same time the times for reappearance of the spacecraft around the eastern LM of the moon will be passed up to the crew with and without a successful LOI burn. There's a slight amount of concern about the sun impinging on the SIM bay experiments because of the present attitude of the spacecraft and the procedure for rolling out of that particular attitude is being generated now to pass up to the crew. Get some of the solar heat out of the experiments. Standing by for the balance of the activities leading up to lunar orbit insertion, this is Apollo Control, at 70:53.

END OF TAPE

SC Houston, let me read you a note I found in the flight plan here right at 38 hours. Over.

CAPCOM At 38 hours?

SC That's affirmative. I woke up after the first night and I find this note in here from Ken. It says: John, we have had some sort of IMU or CMC hardware problem. Right after you went to sleep at 38 hours, the platform course aligned itself, we got it back with an earth-sun alignment. Fortunately, MCC had high belt rate all the time and we'll work it out tomorrow. Sleep tight. Signed PK. And I got up the next morning and I saw that in there, and I said, boy that Ken, sure got a funny sense of humor.

CAPCOM Yes, I guess we would concur with that funny sense of humor. We had some guys here laugh all night.

SC Yes, I guess I didn't believe the note.

CAPCOM I can understand that.

SC Hello, Donald. Are you still there?

CAPCOM We're still with you.

SC Okay, you want to take a look at the biomed then?

CAPCOM Roger, Ken. We're doing that now.

CAPCOM 16, it looks like the SIM bay temps are coming up a little, we may have to change our ROLL angle. We'll come up with an angle for you in just a minute.

SC Okay.

CAPCOM And the biomed data looks good now.

SC All right, sir. And just as a curiosity item, you might note that it takes - with 2 of us working on putting those things on, it takes 15 minutes to put the data on and get hooked up. And I guess by yourself it takes about 20 cause you've got to use a mirror to see all that.

CAPCOM Roger.

CAPCOM Okay, 16. We want you to go to your ROLL of 020 with the same PITCH and YAW angles that you have now. And you should be able to do the P52 in the new attitude and the high gain should stay locked up.

SC Roger. Okay - (garble)

CAPCOM 16, you're very, very weak. Say again.

SC I said, we're there. I guess your temp will be stabilizing now.

CAPCOM Roger, copy.

SC Don, how about if we go ahead and do our P52's now?

CAPCOM Okay, go ahead, Ken.

SC Alrighty, thank you.

CAPCOM Casper, would you verify that you are getting a little bit of the DAP and then the EMP 509 before you do the P52.

SC That should work right now.
CAPCOM Roger. Thank you.
SC Yes, I guess you saw us get out of
sequence there a little, but we're back on now.
CAPCOM Roger. Understand.
CAPCOM Casper, hold up on your procedure there
a minute.
SC Okay, holding.
SC You're pretty good, you stopped old
Casper in midpunch.
CAPCOM Casper, apparently it's necessary to
load the normal DAP before you load the EMP because once
you've loaded the Saturn dap B, LM weights and that sort
of thing will not be accepted by the CMC, so we'd like to
have you take the EMP out, load the normal DAP and then
load the EMP back in. We should have told you about
that earlier, I guess. It slipped by.
SC Well, that's okay, I stopped and
wondered about it, and then I decided I couldn't think of
any reason why it wouldn't work the way we did it. Okay,
we're back in seg now. Now we can start with 509. Is
that affirm?
CAPCOM You've loaded the normal DAP now?
SC That's firm.
CAPCOM Stand by just a minute. We're looking
at it.

END OF TAPE

CAPCOM Okay Ken, it looks real good and you can go ahead now with the EMP and the P52.

SC Okay will do. I kind of like this attitude you picked, Don. It's got the old earth in the telescope.

CAPCOM Hey, wonderful. Flight board says you should be just about over Africa.

SC This attitude for esthetic reasons.

SC Well it's orange. I guess that -- that's sort of saying something.

CAPCOM All right.

SC Don, would you ask (garble) to take and I'm sure it's a typical thing I just never noticed. I was watching the Optic zero the other night and using 1691 is the way to do that and here again I'd watched it and at the completion of the zero it looks it went to -- (garble) register to display now and I'm still in zero I just -- thought that was kind of curious. Is that a bit size or something?

CAPCOM Standby one. We'll look at it.

SC I've taken it out of zero now that's why it's counting. Then we'll go ahead with the 52.

CAPCOM I understand your taking it out of zero now?

SC It was out of zero when it started counting. It went from 403 up to what you see now.

CAPCOM Roger.

SC And that's due to the trunnion strip.

CAPCOM Roger.

SC Don, is there any reason to torque these? Because we're getting ready to go to an option one.

CAPCOM Standby a minute.

CAPCOM Go ahead and torque them. And Ken could you check your -- your mike placement? You're very very weak.

SC Okay Don. Is that any better?

CAPCOM Yes, that's some better, Ken. Thank you.

SC And we'll torque them at 2310.

CAPCOM Roger.

SC Don, just out of more academic interest, it turns out that the TPAC's in the -- in the NOUN 91's are exactly the same.

CAPCOM Roger. I understand.

SC You know what I was going to say is that -- that the TPAC's on the shaft are within the readability of the DSKY. The trunnion then seems to be off by about 200, which I think is a pretty fine agreement. And for the interest for some of those people who were talking about these -- optics and whether they drift or not, if you can watch 1691 right now, you'll find it on -- the fold is manual and I'm in direct, and you can watch them drift slowly. And at

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SC low rate I'll go to resolve and they drift at
approximately the same rate -- there seems to be some question
about that earlier, I thought. Thought the guys in the back
might be interested in that.

CAPCOM Roger. Copy. Thank you.

END OF TAPE

CAPCOM Okay, Casper for your information, although we had you go ahead and load EMP 509 prior to the P52 it was not absolutely necessary at that point because you did this P52 under SCS control and anytime you are under SCS control that TVC relay is not enabled so you really don't have the problem. There's no way the glitch can get to you, but we had to have the EMP 509 loaded eventually so we figured we'd go ahead and let you get it in now.

SC Okay, I understand that and thank you very much.

CAPCOM Roger.

SC But with all this stuff for the next few days it wouldn't hurt to keep a list of those things down there and kind of stay with me on these things, make sure I don't get one of them out of sync.

CAPCOM Roger, we'll follow you.

CAPCOM Casper, Houston when you've got a few minutes to talk we've got a little philosophy philosophy on the use of EMP509 in lunar orbit.

SC Okay, could you standby just a minute, please.

CAPCOM Rog, will do.

SC Pete we moved the eat period up a little bit and we're getting all the food ready here.

CAPCOM Roger. This can standby for quite a while.

SC Okay, I'll come back to you in about ten minutes with all that.

CAPCOM Okay, Ken, good enough. Thank you.

SC Okay, Don, I've got some free hands now and got my little note pad out and I'm ready to listen and copy and discuss anything you've got on this stuff.

CAPCOM Okay, I guess, Ken the first thing we'll talk about is the use of the EMP in lunar orbit, that is when you are alone in the spacecraft. We do not plan to run EMP 509 continuously primarily because if you do you don't have gimbal lock - true gimbal lock protection. What we will do is we will run it during programs that involved TVC ENABLE relay cycling, except for P52. That means that we will run it for SPS burns and you already have the procedures for LOI and DOI and for other burns the procedures will stay the same except that we may change the time sequences for doing some of the items. We will also run the EMP509 for P24 and for rendezvous and we're having MIT verify the compatibility at the present time. We'll come back to you on those with more details later. During P52 with a P20 option 5 our current procedures call for going CMC free. Instead of doing that what we'll do is we'll

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CAPCOM go to this spacecraft control SCS, put the rate switch high, and B-mag mode rate 2 and that way the rate damping level is below your orb rate and so your SCS, as far as control is concerned, will be equivalent to CMC free. However, by going to SCS control - if you want to check back on that list of set and reset conditions you'll have it. By going to SCS control we eliminate the possibility of getting this grid.

END OF TAPE

SC Okay, would you say again how we're going to handle P20. Normally, P20 option 5 we will not use 509, is that correct.

CAPCOM That's affirmative. We will not use 509 during P20 option 5.

SC Okay, and when we come to do a P52, we will still not use the option, for the 509, we're going to go to SCS control and use the rate high and max deadband. Is that correct?

CAPCOM Okay, rate high and max deadband is okay, but the G&C tells me your really, that the deadband you don't need to go to max. It's kind of inmaterial which position you put that switch in. You do need the rate switch in high and you need B mag mode rate 2. That way you don't have an attitude control situation, you have a rate control situation but the level is high enough that it's well above the orb rate and so the SCS will be equivalent to going CMC free.

SC Okay, I understand that, thank you.

CAPCOM Okay -

SC I'll leave it in dead band then in rate high.

CAPCOM Roger, and we'll get more details to you later on the P24 and rendezvous.

SC Okay, your doing good work.

CAPCOM Ken, there's one other comment here. If you are going to, at some point in lunar orbit do quite a bit of optics switching, like manual and automatic and that sort of thing, we would suggest in that case that you load EMP 509 before you start playing with the optics and take it out again when you're finished.

SC Okay, anytime we're doing that, I assume that means like in when we're doing the landmark tracking in both high and low, and it's my understandings from the comments we've got now that the only time 509 can get me in trouble is if I leave inabled during thrusting.

CAPCOM That in general -

SC And it also looses the automatic gimbal stop.

CAPCOM That's absolutely correct, Ken. Those are the two cases.

SC Alright sir. Thank you very much. Hey, you might tell Tom Holloway that his little "dope pad" has really come in handy. That's super!

CAPCOM He's sitting here smiling and giving me the thumbs up right now.

SC Charlie just asked that everybody lock the doors until he finds his - piece of (garble)

PAO This is Apollo Control. 72 hours 1 minute ground elapsed time. 2 hours 15 minutes prior to the time of Apollo 16 passes behind the moon. The begining of the first lunar orbit. The crew has moved up their meal period a few moments

PAO earlier, than scheduled in the flight plan, and are now having their noon meal. Spacecraft presently 6,322 nautical miles out from the moon, approaching at a velocity of 4,281 feet per second. Continuing to stand by as we approach lunar orbit. Maneuver for lunar orbit coming up in a few hours, about 2 hours and 26 minutes from now. 72:02, this is Apollo Control.

SC Don, how about if I put off the skin reshield thing for another 10 minutes.

CAPCOM Stand by one.

SC Okay, we're going to go ahead and get it out.

CAPCOM Okay.

SC Shield is off at this time. We'll turn it back in 10 minutes.

CAPCOM Roger.

END OF TAPE

CAPCOM And 16, I've got a TEI 4 pad if you're ready
to copy.
SC You caught us at desert.
CAPCOM Roger, we'll stand by.
SC Thank you, Don.
SC Okay, Pete. Go ahead with you P30 pad.
CAPCOM Stand by just a minute, Charlie. Okay, Charlie,
TEI 4 SPS G&N 41534 plus 064 plus 135 083 07 1413 plus 32896 plus
11501 minus 03276 181 056 022. Rest of the pad is NA. Set stars
Sirius and Rigel 131 071 014. Ullage 2 jet 17 seconds. Under
other 1, burn undocked, 2 assumes no DOI, 3 assumes landing site
REFSMMAT, 4 with LOI REFSMMAT roll 179 PITCH 183 YAW 014.
SC Okay, Houston. TEI 4 is SPS G&N 41534 plus
064 plus 135 083 07 1413 plus 32896 plus 11501 minus 03276 181 056
022. Sirius and Rigel 131 071 014. 2 jet 17 seconds. 1 is burn is
undocked, 2 assumes no DOI, 3 landing site REFSMMAT, 4 LOI REFSMMAT
179 183 014, over.
CAPCOM That's affirmative, Charlie.
SC Uppedes 6 to 8 here, looking through the telescope
earth is sure apparent that we live on a pretty planet. The colors
are just such - lot more vivid than any of the photographs.
CAPCOM Roger, we understand. We were just enjoying
some of the beauties of earth ourself.
SC Nobody new serving coffee, uh?
CAPCOM That's affirmative.
SC We're wise to you new people.
SC How many pots has the moker gone through already?
CAPCOM We'll have to get you a count but Jerry says it's
a new record.

END OF TAPE

CAPCOM 16, Houston. I've got a map update, rev 1 it's about 73:20 in the flight plan and also I've got some answers to Ken's earlier question about this glitch and what if it occurs following a burn.

SC Go ahead.

CAPCOM Okay, map update rev 1, LOS 074 1741 180 degrees 074 31 39. AOS with LOI 074 50 05 without LOI 074 42 08.

SC Okay 074 17 41 074 31 39 074 50 05 074 42 08.

CAPCOM That's affirmative. Okay, now Ken on this other question, as we understood your question you are concerned about what happens after 2.5 seconds after the burn when you switch back to the RCS DAP and cycle is relayed. What happens if you get the glitch and it looks like there are two cases. Either you get a yaw glitch of sufficient magnitude to put you into coarse aline or you get some kind of glitch that could be in roll, pitch or yaw but does not put you into coarse aline. If you go into course aline, the nab is no good, and the NOUN 85's are no good and in that case we'd like you to exit average G as soon as possible by exiting the program. If you're not in course aline, the nab is good but the NOUN 85's are still no good.

SC Okay. Okay, we've got you.

CAPCOM Roger.

SC I particularly (garble) there is no trim it's only a problem for recording purposes anyhow.

CAPCOM Roger, that's correct.

SC Okay, thank you very much.

CAPCOM 16, Houston I've got 3 items to go in the flight plan at about 79: 29 is the first one, and if you can get these in that will finish up the flight plan updates for today.

SC Okay, press on.

CAPCOM Okay, at 79:29 right at the bottom of the page there, we want to add load EMP509 and at 79 -

SC I had over behind load NOUN 89.

CAPCOM That's affirmative, after, it should follow the load NOUN 89.

SC Okay, I've added load 509 after load NOUN 89.

CAPCOM That's affirmative.

END OF TAPE

SC Okay, I've added low 509 after low noun 89.

CAPCOM That's affirmative. And at 7938, we want to delete the verb 48 there and that's not associated with the 509. That's simply because that's redundant. You're already in that DAP configuration.

SC Okay.

CAPCOM And at point 7942, right after the mispent update block there, add terminate EMP 509 after P24 completed.

SC Okay, terminate 509 after P24 is completed. Now let me - is that the last one or have you got some more?

CAPCOM That's all of them.

SC Okay, let me read them back to you where I've got them to make sure I have it all right. At about 79 and 29-1/2 on the page, I've written load 509. I deleted the verb 48 which occurs at 7938 and 7941-42, I've got terminate 509 after P24 is completed.

CAPCOM That's correct, Ken.

SC Okay, thank you.

SC And Don, on this first REV, if we wanted to take some pictures or something, can we stick with magazine November-November, I can't tell right now what that's scheduled for or shall we use magazine victor?

CAPCOM Stand by, we'll let you know.

SC Thank you, sir.

CAPCOM Our test period November-November looks pretty low on the pad, you should go to magazine victor.

SC Thank you.

CAPCOM 16, Houston. We've got a couple more words on the LM paint peeling problem. Apparently, it has been duplicated now, in a vacuum chamber, and it does not appear to be any kind of problem as far as the mission is concerned.

SC Well, that's fine to hear. Thank you now.

CAPCOM Roger. It's nothing leaking, it's just the paint itself.

SC Okay. Don, we're getting ready to start into the secondary glycol lub check.

CAPCOM Okay, we're ready to follow.

SC Okay, the secondary cool lub pump is about to go off.

CAPCOM Roger.

SC (garble) on the secondary lub.

CAPCOM Roger.

SC Okay, and we see the on-led temperature decreasing.

CAPCOM Roger.

SC Houston, 16. Are you all satisfied with the nitrogen pressures on the SPS?

CAPCOM That's affirmative.

SC Thank you.

SC Houston, LM's CM DELTA B is .2 again.

CAPCOM Roger. LM CM DELTA B .2.

SC Houston, I just got my head unlocked and (garble) it out of window 1, and we have a half moon in earth shine. It is really pretty.

CAPCOM Roger.

SC It's really (garble), you can see all the, you know you can see all of the prominent features and little sharp craters like, I think I'm looking at Kettler, it's out there in the middle of the mare. It's just beautiful. And that's all earth shine.

CAPCOM Roger.

SC And it just, it's like two thirds of the window. And I've got my hand no more than 6 inches from it. You know on the dark side you can see a big dark DISK and I think the reason I can see it is that it's the solar corolla that's illuminating around the back side, and I can see a star within, well, it's maybe within a degree of the Moon's disc.

CAPCOM Roger.

CAPCOM Could we get the LMP to confirm that that's really the moon and not the earth you're looking at.

SC Hey, babe, this is really the moon. It's the most awe-inspiring sight I've ever seen in my life. Looks like the door that just hung out there in the middle of blackness. It's really beautiful, Pete.

CAPCOM Rog.

SC And you can make out all the features on the thing. I can see (garble) you can see up into the (garble) in the basins in there, you can even see the outer rings of Oriental in the, you can't see the basin itself, but you can see it's outer rings.

CAPCOM Sounds beautiful, kids.

SC And now looking at our present orientation, I can tell that our new attitude will be perfect for LOI.

CAPCOM Roger.

CAPCOM Ken, just for your information the reading that you got when you zeroed the OPTICS on the NOUN 91 sequence was considered normal, and it's like a single bit or less than a single bit error, and the other thing I wanted to pass on was that this EMP 509 has been verified by MIT for use with P24 and during rendezvous.

SC Okay, thank you.

SC Don, where do I waste the 2 frames of BHBW? Could you tell me if it's better to use the FF or TT?

CAPCOM Stand by.

SPEAKER If you dial channel 6 you can see a plot of the (garble).

CAPCOM Magazine TT, Ken.

SC We copy.

SC Okay, I'm up to 3 exposures on magazine TT.

CAPCOM Roger.

SC Houston, 16. Do you have any objections to our going to the burn attitude now?
CAPCOM Stand by a minute.
SC Was that affirmative or negative, over?
CAPCOM Stand by one.
CAPCOM 16, give us P00 and ACCEPT and we'll give you your uplinks and then you can maneuver.
SC P00 and ACCEPT.
CAPCOM Roger.
SC Okay, Houston, the reason we would like to go now is it looks like to me you can't get there without going through gimbal lock, but we want to see what the DAP wants us to do.
CAPCOM Roger, understand.
CAPCOM Okay, 16. You can start maneuvering and we'll help you watch the gimbal lock situation, and I also have an LOI pad whenever you're ready to copy.
SC Go ahead, Pete.
CAPCOM Okay, LOI SPS G&N 66314 plus 121 minus 014 074 282722 minus 27816 minus 02196 minus 02562 000 001 000. NOUN 44 is 01700 plus 00583 28020 614 27947. Sextant star 16 2429 271. Rest of the pad is NA. Set star is Sirius and Rigel 132 196 006. Ullage none. LM weight 36287. Single bank burn time 628.
SC Okay, we copy LOI SPS G&N 66314 plus 121 minus 014 074 282722 minus 27816 minus 02196 minus 02562 000 001 000. 01700 plus 00583 28020 614 27947. 162429 271. Rest of the PAD is NA. Sirius and Rigel 132 196 006. No ullage. LM weight 36287. Single bank burn time 628, over.
CAPCOM That's affirmative, Johnny.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/19/72 1:19CST 73:25 GET 244/1

CAPCOM OMNI DELTA 16, OMNI DELTA.
CAPCOM 16, Houston, how do you read?
SC I have a fiveby here in OMNI DELTA.
CAPCOM Roger. You're at fiveby. 16, Houston,
voice check.
SC Roger, fiveby Pete.
CAPCOM You're at -- loud and clear, Charlie.
SC Okay, we're going into this sextant star
check.
CAPCOM Roger.
SC (Garble) right in the middle there, Houston.
CAPCOM Roger, very good.
CAPCOM 16, would you stow the high gain antenna
please?

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/19/72 1:51CST 73:57GET 245/1

CAPCOM
SC

16, you are go for a LOI.
16, roger. Go for LOI.

END OF TAPE

SC Houston, we're preparing for the gimbal drive check.

CAPCOM Roger.

SC Okay, we've completed the gimbal drive check, we're now going to terminate 509.

CAPCOM Roger.

SC Okay, 509's out of there. How's it look?

CAPCOM Looks real good, 16.

SC Okay.

CAPCOM 16, we're a couple minutes from LOS.

See you on the next pass.

SC Okay, we'll be there.

PAO This is Apollo Control. Apollo 16

spacecraft has passed behind the moon 2 seconds early according to the loss of signal clock in the control center here. To review some of the upcoming numbers with the lunar orbit insertion maneuver, ignition time will be at 74:28 - 74 hours 28 minutes 27 seconds ground elapsed time - about 10 minutes from now. The total DELTA V, or velocity change, will be 2802 feet per seconds - feet per second in retrograde. Apollo 16, at the end of the burn will be in a lunar orbit measuring 58.3 nautical miles pericyynthion and 170 nautical miles in apocynthion. Total burn time with the 2000 pound thrust - 20 000 pound thrust service propulsion system engine will be 6 minutes 14 seconds. With a successful lunar orbit insertion burn, the spacecraft will be acquired again by the Manned Spaceflight Tracking Network at a ground elapsed time of 74 hours 50 minutes 5 seconds, but in the remote chance that there is not a burn - no ignition for some reason, the time without a burn would be 74 hours 42 minutes 8 seconds. The estimated impact time for the S-IVB third stage of the Saturn 5, which propelled Apollo 16 on the way to the moon. That impact time now is 75 hours 0703, and because of no tracking available over the last day or two, this is an estimate based on last predictions. It will not be within the field of view of the spacecraft even though they will be coming around the front side of the moon at that time. It will be over the spacecraft's horizon. The seismometers from the earlier Apollo Lunar Surface Experiment Packages left on the Moon by earlier missions will be monitored to detect the S-IVB impact, which is equivalent to about 11 tons of TNT. Some 29 minutes away from acquisition of signal, assuming a nominal lunar orbit insertion burn, and 17 seconds away from ignition on lunar orbit insertion. Come back up again prior to AOS, or acquisition of Apollo 16, as it comes around the east side of the Moon. And at 74:21 ground elapsed time this is Apollo Control.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/19/72 CST 02:27 GET 74:33 247/1

PAO This is Apollo Control at 74 hours 33 minutes ground elapsed time. The lunar orbit insertion burn, presumably still underway at this time having a 6 minute 14 second duration an ignition time of 74 hours 28 minutes 27 seconds; and if the burn is successful completely normal, the spacecraft will come around the east rim of the moon in 16 minutes 30 seconds. That would be at a ground elapsed time of 74 hours 42 minutes 8 seconds. However, if for some reason, the burn is not successful or we have no ignition on the service propulsion system engine, the spacecraft will reappear much sooner at about 8 minutes from now, or at ground elapsed time of 74 hours 50 minutes 5 seconds. To repeat again the predicted S-IVB impact time, 75 hours 07:03. One of the large television rear projection Eidaphor machines, it does carry the seismometer trace from one of the earlier Apollo Lunar Surface Experiment Packages, and the flight controllers here in the controls room will be watching that with interest, as we approach the impact time. At 74:34 and returning at the no-burn AOS time in some 7 minutes, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control at 74 hours 41 minutes ground elapsed time. Less than a minute away from the time at which the spacecraft should come around the corner of the moon assuming we had not a successful lunar orbit insertion burn. The acquisition time with the normal burn would be at 74 hours 50 minutes 5 seconds some 8 minutes 8 seconds away from this point. Mark. No noise on the down link. Apparently the spacecraft did have a successful burn. To repeat the acquisition time, with a successful burn 74 hours 50 minutes 5 seconds. At 74:42 ground elapsed time, this is Apollo Control.

PAO This is Apollo Control less than a minute away from acquisition of signal from Apollo 16, and it appears at least from the timing, that we have indeed had a successful lunar orbit insertion burn, which according to pre-burn planning, should produce an elliptical orbit around the moon, with a pericyynthion of 58.3 nautical miles, apocynthion of 170 nautical miles. We'll stand by here for the first words from the crew and the burn report. Displays being change here in the control center from the earth-moon transit display in the center scribing ploter to the lunar orbit plotter. Mark-Zero. Let's leave the line up now.

PAO Confirmed AOS.

SC Hello, Houston. Sweet 16 has arrived.

CAPCOM Roger, 16. Copy you loud and clear.

SC Okay, Pete. Super double fantastic burn.

If you're ready, I'll give you a burn status report.

CAPCOM Okay, go ahead John.

SC Okay, Delta-TIG was 0615 burn 615.1 burn time, plus 28039 (garbled and heavy background noise) plus .2 minus 0 minus .1. Delta-VC is minus 5.5. Fuel 376 ox. 371. 150 unballanced decreased. Okay, at ignition, we got a momentary SPS light, then it went out, during the burn, the oxydizer pressure read 200, the fuel side was a little bit low and was about 165 on my gauge. After shutdown the fuel side climbed to 170. The oxydizer went to about 202 with an SPS light and we still got it, over.

CAPCOM Roger, we copied everything except the ROLL PITCH and YAW which was blacked out by some noise.

SC Okay, the TRIM attitude, we did not TRIM.

The residuals were as we gave you after the burn but attitude was 005 358 002, over.

CAPCOM Roger, we copy.

SC And it was a slight transient when the second bank was lit, but I don't remember from previous burns, you might look at that data, but it was super.

CAPCOM Rog, got it.

SC And it appeared to me that the chamber pressure dropped off just as we brought the second bank on. And as you can see we're in 170.4 by 58.3 according to the old computer and that babe just rifled it right down the line.

CAPCOM Righty.

SC And everybody is looking out their window. And right now we're looking right down at crater King, and it's just as fantastic as it always has been.

CAPCOM Roger.

SC You can see those little dark, those little dark, looks like volcanic black spots up in the north sector of it, and you can see the central peaks with a varied, very white central peaks covered by lighter grey, grey brown material that sort of looks like somebody painted it on there with a, with a paint brush.

END OF TAPE

SC Hey there Pete, your first view at Tsiolkovsky from our window is pretty - it's a spectacular sight - like a marshmallow float - the central peak floating in top of a --

SC Hot chocolate.

SC It's like 3 guys - they've each got a window and we're staring at - at the ground - it's really - this has got to be the neatest way to make a living anybody's ever invented.

SC Pete, 16 here. Another pretty sight we had before burn was the earth set. It was really quite a view.

CAPCOM We're all sitting here listening to you. Tell us about it.

SC Pete, you got the pan camera's power on?

CAPCOM Okay, pan camera's power on.

SC How did the SIVB look?

CAPCOM It hasn't happened yet, John. It's got another 9 minutes or so.

SC I trust we're not getting there the same time it does?

CAPCOM I trust.

SC Okay.

CAPCOM It's going to hit on the southwest corner of Rhineholt -

SC Say again, Pete.

CAPCOM Tell Ken it's going to hit on the southwest corner of Rhineholt. He should know where that is.

SC I'm sure he does.

SC Okay, let me get the binoculars out here - playing with them. It's pretty interesting - I'll tell you all that time spent with Farouk it's sure really going to pay off, cause it does look like old home.

CAPCOM (garble)

SC Lawn needs mowing and all that

CAPCOM Okay, Casper, pan camera power off.

SC Rog.

PAO This is Apollo Control, 75 hours 1 minute ground elapsed time. Completely successful lunar orbit insertion burn, with a duration of 6 minutes and 15 seconds. Reported on board measurements on the lunar orbit 58.3 by 170.4 nautical miles. We'll continue to monitor this first front side pass and lunar orbit number 1 at 75:02 this is Apollo Control.

SC Pete, looking out at the horizon you can really tell your in the highlands, the horizon is really jagged looking.

APOLLO 16 MISSION COMMENTARY 4/19/72 CST 2:48P GET 75:54 249/2

CAPCOM Looks like coming up on the rockies, huh?
SC of course, we're starting to come up over the
flat lands now, over the Smyth Sea, I remember a land mark
attract down there on Apollo 10, it's still there. You can't
really tell by looking at it that the Smyth Sea is any, any deeper
or lower, than the data shows it is. But in the surrounding
terrain.

CAPCOM Roger.

END OF TAPE

SC -- craters and Smythii remind me a lot of Coral Atoll. They just got the ridges sticking up and the bottoms of them up here to be flooded with the same material that's in Smyth.

CAPCOM We're digging out a map now, 16, to take a look at --

SC We're going to get a close-in picture of Humboldt, here, as we come up -- because we'll probably miss it on the next round.

CAPCOM Roger.

SC It's really a fascinating crater, the way the dark mare has got in -- sort of like a path around the edges, and there's a fracture pattern running across it, and it has some very prominent central peaks that are very white. But it has every contrast and color on the Moon.

CAPCOM Does it?

SC Boy, those fracture patterns running down through it are white -- appear to be white layered fracture patterns. Makes it look like somebody has drawn them on there with a piece of chalk.

CAPCOM S-IVB is impacted.

SC Okay.

PAO Seismograph traces beginning to show of the S-IVB impact at approximately 75:09, ground elapsed time.

SC Houston, out my window is fine now. We got Petavius with it's central dome of whitish cap dome, and it's a fairly subdued crater, and the lineations running into it -- the rilles or whatever they are -- just like it's shown on the map here.

SC Some of those central domes are exceptionally dark, and they have exceptionally dark material running down a white surface -- you can see that.

SC With the binoculars we passed over Langreus and you can see blocks on the tops of the central peak, and some features that probably are there that I just haven't noticed before in that central feature. You can see an awful lot of -- looks like a demarcation where the central feature -- looks like a crack in it -- has a whole ring of craters that come in dots that boundary. And then you see some more of those little craters up along near the top of the central lineament also. You just don't see those kind of things stand out at you without the binoculars.

CAPCOM Roger.

SC Also say that the binoculars have good power, the maximum you can hold in your hand, you got to get yourself set up very nicely for it before you start.

CAPCOM Roger.

SC And, we're coming up over the Messier A and B craters.

END OF TAPE

PAO This is Apollo Control at 75 hours 8 minutes ground elapsed time. Crew of Apollo 16 still 3 tourists in their first lunar orbit observing the features of the Moon, calling out various craters as they pass over them. S-IVB impacted the lunar surface at about 75:09. Signals are still coming to the ALSEP, coming out on the recording graph of the normal lunar seismic activity made rather straight line up until the time of impact and the strokes of the recorder are broadening continuously as the seismic waves travel through the Moon to the ALSEP site. Some 55 minutes until loss of signal remaining in this first lunar orbit. That's 75:19 this is Apollo Control.

PAO This is Apollo Control at 75:20. Apollo 16 Commander John Young becomes the first human to go into lunar orbit twice, having flown on Apollo 10 which is a precursor to the landing missions. Apollo 10 mission descended to within about 8 miles of the lunar surface and the, that is the lunar module did. Jim Lovell has been to the Moon twice, but the second trip, the first having been Apollo 8 the first manned lunar orbit mission, the second being in Apollo 13, which was an aborted mission and coasted past the Moon and, therefore, Lovell did not go into lunar orbit on his second trip. At 75:21 this is Apollo Control.

END OF TAPE.

SC Houston, we're coming up on Theopolus now, central peaks in the shadows and as we approach the terminator looking out towards the horizon it really looks rugged.

CAPCOM Roger.

PAO This is Apollo control. Members of the orange team of flight controllers under Pete Frank are beginning to drift into the room for the change of shift hand-over at 4 p.m. central time. We're estimating the change of shift press briefing in the small briefing room building 1 press center for 4:00 somewhat earlier than would be normal, normally the case, with flight director Jerry Griffin.

CAPCOM 16, if you will give us a computer and go ACCEPT we'll give you a REFSMMAT.

SC You've got it. Just now looking at the alti scarp boy it's well named to this lighting.

CAPCOM Roger.

SC Looks like the walls are vertical, I'll admit the lighting exaggerates it but that's how it looks.

CAPCOM Roger, copy.

CAPCOM 16, we're finished with the uplink.

SC Okay, back to lock.

SC In this lighting you can see the crater Descartes and it stands out much bigger than you would expect because of the low sun angle. And I've had to look at my map in order to make sure that was what I was looking at. And the material that runs out of it that's in the area, - the things we talk about as being the bright reflected area, in this low sun angle adds a much blockier and jumbled appearance than it does on any of the high sun photographs.

CAPCOM Roger.

SC It looks very much like looking down on a clinkery, a big clinkery cinder field, but on a much larger scale.

CAPCOM Roger, copy.

SC Yeah a big, a big rounded surface clinkers it's fantastic boy is that rough.

SC Okay, Houston as we look to the west and pass the terminator there a couple of degrees past the terminator there is one bright spot, a peak standing up which is west of, west of . . .

CAPCOM Charlie, your fading out.

SC . . . really high ground.

SC Say again.

CAPCOM Right after you started talking about this peak and you said something like west spot you faded out. Go ahead, Charlie.

SC Yes, the general opinion here is that we may be looking at part of the Smokey Mountains sticking up through the shadow.

CAPCOM Terrific.

END OF TAPE

CAPCOM 16, FAO advises you've got some extra film on magazine U U that's VHBW and you can use it for targets of opportunity and you can use the CEX exposure graph and stop down one stop from what you get off the graph.

SC Okay, I hear you.

CAPCOM Casper, on that last transmission as an example, F11 for the CEX you should go to F16 to use with magazine UU.

SC Okay.

SC Don, I'd like to verify how we're going to do the P52 again now, any ideas that we'll go to place the SCS controls into rate high and dead band has been at the proper time I'll - I've got the B mags in rate 2, I'll go to SCS control then I don't have to worry about loading 509 and I'll just go ahead and do the P52 and then when we're through I can go back to CMC control, is that correct?

CAPCOM That's affirmative.

SC All right sir, thank you.

PAO This is Apollo Control, at 75 39 ground elapsed time. Apollo 16 approaching the lunar terminator or sundown; in about 4 minutes. At the present time, the crew is conducting a program 52 realignment of the inertial measuring unit - inertial measurement unit in the guidance system to repeat again, the change of shift press briefing with Flight Director Gerry Griffin will be about four o'clock central time at the Houston News Center briefing room. At 75 39, this Apollo Control.

SC Hey, Don, we're trying to set up the camera for the next terminator at sunrise, and I thought I understood what you told me about the settings, but I guess I don't. Could you run through that again? I guess I just as soon have you give me the proper settings.

CAPCOM Are you talking about this magazine UU that I just called up?

SC Yes sir, the VHBW.

CAPCOM Roger, stand by. Ken, they're looking it up for us right now, in the mean time I'll try to give you the rule again, maybe that'll clear it up some. You can use that CEX exposure graph that you have onboard and take the readings off that -

SC Rog.

CAPCOM - and then simply increase the stop number one stop. For example, if the CEX exposure graph calls for F11 and you are going to use the magazine UU you should go to F16.

SC Yes, okay. When you used that example I thought you meant that specifically, and I couldn't make that correlate. Okay. And Charlie says this magazine is

APOLLO 16 MISSION COMMENTARY 4/19/72 3:26 CST 75:32 GET 253/2

SC HBW instead of VHBW.
CAPCOM That's affirmative, he's right.
CAPCOM Casper, for the terminator photography,
on the next rev we are recommending you go ahead and use
magazine SS that's Sierra Sierra.
SC Okay use the one we planned on.
CAPCOM That's affirmative.
SC Okay, thank you.

END OF TAPE

CAPCOM And Casper, the call Omega is in UU, we meant to impart to you that you could use that for targets of opportunity.

SC Rog. Okay, thank you.

CAPCOM 16, put the high gain on auto.

SC Houston, did you copy our torquing angle?

CAPCOM Affirmative. We got them.

SC Say again, please.

CAPCOM Affirmative, we got them.

SC Okay, Don, one comment I'll try again and take a look at the OPTICS when we get out into double umbra, but right now in the telescope I can see the stars now, but I still can't see star patterns like we looked at Antares and you just couldn't see the Scorpion at all. And that may be due to the extreme amount of earth shine that is being reflected off of the LM. That LM is like looking at it almost in daylight and good gosh the Moon looks like you can see every thing on there just like it's really bright.

CAPCOM Right. Okay, Ken, we understand.

PAO This is Apollo Control, we're ready to switch now to the MSC news center briefing room, for our change of shift briefing. During the course of that briefing we'll be recording air to ground conversations with the crew for playback immediately following. At 76 hours 9 minutes, this is Apollo Control, Houston.

END OF TAPE

PAO This is Apollo Control at 76 hours 27 minutes. During our Change of Shift Briefing Apollo 16 went behind the Moon nearing the end now of their first revolution of the Moon. We accumulated a small amount of taped conversation with the crew as they went around the corner on this first revolution which we will play back for you at this time.

CAPCOM 16, you are about a couple of minutes from LOS, everything is looking good and while you are behind the Moon, we'll change shift and pick you up on the next rev.

SC Okay, we sure enjoyed it and we really appreciate all of the things that you guys are doing to get us into orbit here and I don't - that's the kind of help that really does it for us, thank you much.

CAPCOM Roger, thank you.

PAO We'll be reacquiring Apollo 16 in about 30 minutes. At the present time, Flight Director Pete Frank is reviewing the mission status with each of his Flight Controllers. Our spacecraft communicator at this time is Astronaut Hank Hartsfield and our tracking data shows Apollo 16 to be in an orbit with apolune of 169.9 nautical miles a perilune of 58.1. At 76 hours 29 minutes this is Apollo Control.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/19/72 16:55 CST, 77:01 GET 257/1

SC Icarus and the black of the Sea
of Moscow and the material to the north of of us at the
terminator we don't think we got (garble) though.

PAO Those enthusiastic descriptions of the
lunar surface have come from all 3 crewmen. Most recently
we heard from John Young and Charlie Duke. The noise on
the communication circuit at the present time is due to the fact
that we are using one of the OMNI antennas on board the spacecraft
for communications. The crew will be switching over to the
high gain antenna soon and that should quiet things down
a bit.

END OF TAPE

SC Okay, Houston, we have you on the high gain.
How do you read, over.

CAPCOM Okay, I read you 5 by 5.

SC Okay, Hank, I'm turning the pan camera to
mode to standby and power ON.

CAPCOM Roger.

SC Hank, I'm sure they have been described
before, but the most -- to me the most unique craters up here --
are two that we're just going over now. Her ejecta blanket is
completely white with a white interior, but with a black rim
to them.

SC Houston, 16.

CAPCOM Go ahead.

SC Hey, Hank, how do the SPS data look?

CAPCOM Okay, we were just talking about that, Char-
lie. Probably we had a real nominal burn. Our data down here
shows burn time of 6 minutes 14.2 seconds, which is right on
the money. And I got a few words on that PC drop. I understand
that's completely normal for the first dual bank burn, due to
some helium bubbles that are normally trapped between the ball
valves. So, that wasn't unexpected for the first dual bank
burn, you shouldn't see it again. And as far as the SPS pres-
sure light that came on -- we warned you earlier to expect that,
due to the pressure surge of the tank's pressurizing, we -- you
were right on the 200 PSI limit -- that triggered it. The se-
cond pressure light you got, which is apparently still on, is due
to heat soak back into the tank, so it's not unexpected either.

SC Okay, fine. We passed that word on to you
about the light. Not that we weren't expecting it, but just
to tell you what had happened.

CAPCOM Okay.

CAPCOM 16, track mode AUTO on high gain.

SC Okay. You've got it.

SC Houston, 16, over.

CAPCOM Go ahead.

SC That crater Icarus we got the profile pic-
ture of, it's a big round crater and it has real steep walls,
and the central peak is a little above the crater walls, and
you'll see that profile when you get the picture back. But the
shape of the central peak is such that the only Earth analog I've
ever seen that look like it was sort of a shield volcano...I never
saw anything like that -- now, I'm not saying the whole thing
is not an impact, but that central peak is really unusual.

CAPCOM Roger, we copy and we're also through with
the pan camera -- you can go power OFF on that.

END OF TAPE

SC Houston, apparently this line of secondaries down here that cross the mare gives you the impression that there have been a couple of great big chickens been walking across there.

CAPCOM Roger.

SC That was courtesy of Charlie Duke our air borne geologist and chicken farmer.

CAPCOM Roger, maybe you had better watch your step.

SC I'm watching.

PAO Those last two picturesque descriptions first of the crater Icarus with it's unusual central peak and second of the chicken tracks were from John Young.

SC Hank, you can tell Farouk that those smooth areas we thought we saw around Isadorius Capella are indeed uniquely different in texture. They are quite smooth. We'll get a chance to play with them later.

CAPCOM Hey, that sounds real interesting, Ken. How are your systems checks coming?

SC Rog, Hank, we've already finished those.

CAPCOM Okay.

PAO Ken Mattingly's reference on that last observation was to Farouk Alboz, one of the geologists who has worked very closely with the crew and particularly with Mattingly in training him for the orbital photography and recognition of geologic landmarks on the Moon.

SC Henry, the amount of terminator movement one rev is kind of dramatic up here. Last time around Descartes just barely showed as a crater, but show very dramatically and now it's - as it moves out its starting to lose some of the starkness and I'll get a picture of this bright zone and it sure looks right now the material that is just to the north of the crater Descartes and that stuff that we talked about going between Delambre B and Descartes A are in fact extensions of the things that go into the Smokey and Stone Mountains. They, right now, look like they have a very similar texture.

CAPCOM Roger, we copy.

SC Hank, it sure looks like we can see Gater and Palmetto from here. It's almost straight down.

CAPCOM Does it look like the map?

SC Well, that stuff around the outside sure doesn't look like it did at high sun.

CAPCOM Apollo 16, Houston, if you will give us ACCEPT we'll uplink state vector and target load.

SC You have it.

CAPCOM Apollo 16, Houston, I have your DOI pad, your map update, and landmark pad whenever you are ready.

SC Okay, go ahead with the DOI pad.

APOLLO 16 MISSION COMMENTARY 4/19/72 CST 17:18 GET 77:24 259/2

CAPCOM Roger. DOI SPS G&N: 41441 plus 187
minus 071 078 33 4439 NOUN 81 minus 02053 all zips minus ...

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/19/72 CST 17:34 GET 77:40 260/1

CAPCOM 53 all zips minus 00 455 000 274 000 00585 plus 00103 02103 024.2 02038 sextant star 22 2048 217 the rest of the pads NA. Set stars Sirius and Rigel 131 071 014 4 jetts, 15 seconds end of pad.

SC Okay, copy, DOI SDS G&N 41 441 plus 187 minus 071 078 3344 39 minus 02 03 53 plus all balls minus 00455 000 274 000 00 585 plus 00103 02 103 024.2 02 038 22 2048 217 the rest of pad is NA. Sirius and Rigel, west 31 071 014, 4 jetts 15 seconds.

CAPCOM Good readback, Charlie. I have your map update rev 3 whenever you're ready, Charlie, it's 7905 in the flight plan.

SC Alright, why don't you give me the map update and a land mark pad.

CAPCOM Map update, LOS 78 23 17, 78 48 09, 79 10 25, land mark pad is T-horizon 79 34 11, 79 36 22.

SC Roger, copy. Map update of 07 8 23 17, 07 8 48 09, 079 10 25, land mark tracking is 79 34 11, 79 36 22.

CAPCOM Good readback. 16, the computer is yours and I have your TEI 5 pad for the update book.

SC Okay, Hank, before we do that looking at the changes in the flight plan here we got to load the VERB 48 to put in the proper DAP and that's to start 509 and then go to the P-52. Can we go ahead and stop the maneuver now and will this attitude clear enough things so we can get a P-52 in there.

CAPCOM Stand by.

SC I'm sorry I didn't copy that.

CAPCOM Roger, stand by a minute, Ken, I'll have FAO check.

SC Thank you. I was worried about getting in the same problem we get into after undocking tomorrow where it might take a special angle.

CAPCOM roger, understand. Apollo 16, Houston, FAO says this is a good attitude.

END OF TAPE

CAPCOM 16, Houston, are you ready for the TEI 5 pad, yet?

SC Rog, go ahead.

CAPCOM Okay, pad follows: TEI - 5 SPS G&N 39838 plus 061 plus 119 084 314136 981 plus 35252 plus 12473 minus 00868 182 056 022 the rest is NA set stars Sirius, Rigel 131 071 014 2 jets 17 seconds other 1 burn undocked 2 assumes DOI 3 landing site REFSMMAT.

SC Rog, TEI 5 SPS plus G&N 39838 plus 061 plus 119 084 314136 plus 35252 plus 12473 minus 00868 182 056 022. The rest of pad is NA, Sirius and Rigel 131 071 014 2 jets 17 seconds. Other 1 is burn undocked 2 assumes DOI 3 landing site REFSMMAT.

CAPCOM Good readback, Charlie.

PAO This is Apollo Control at 77 hours 54 minutes. During the last few minutes among the sets of numbers passed up to the crew by CAPCOM Hank Hartsfield, were those they will use in performing the descent orbit insertion maneuver, and that burn is to occur at 78 hours 33 minutes 44 seconds. The maneuver will be performed using the spacecraft service propulsion system engine. It will be primarily a retrograde burn resulting in slowing the spacecraft by about 203.8 feet per second or about 136 miles an hour. And as a result of that, we expect the orbit to be changed to a 58.5 by 10.3 nautical miles. This is the orbit from which the spacecraft will begin the powered descent to the lunar surface on the 13th revolution.

SC Houston, do you want to take a look at our rotated vector in P40 before we start our maneuver?

CAPCOM Roger, stand by.

CAPCOM The P30 looked good, Ken.

SC Okay, the question was do you want to take a look at the rotated vector P40 before we start our maneuver, or can we go ahead and start the maneuver?

SC Houston, did you miss the question?

CAPCOM Negative, but we're having trouble finding an answer.

SC Oh, okay.

CAPCOM 16, Houston, go ahead and call P40 then maneuver.

END OF TAPE

CAPCOM 16, Houston, go ahead and call P-40 and then maneuver.

SC Okay, got enough look now?

CAPCOM He's looking at it now, Ken. Got a good vector. Go ahead, Ken.

PAO This is Apollo Control at 78 hours 2 minutes. At the present time the Apollo 16 crew is in the process of putting the spacecraft in its proper attitude for the descent orbit insertion maneuver. That burn is to be performed in 31 minutes 30 seconds with the spacecraft out of radio contact on the backside of the Moon. We have about 21 minutes remaining before we lose radio contact and in that amount of time we'll be monitoring spacecraft systems, flight dynamics officer will be taking a last look at all of the numbers passed up to the crew to assure that the burn is the precise maneuver that we want to perform. Based on the numbers provided and which are entered in the computer on board that burn will be 24.2 seconds in duration and targeted to give us an orbit of 58.5 by 10.3 nautical miles. The current orbit is 169.9 by 58.1.

CAPCOM 16, give us OMNI Delta.

SC Hey, you got it.

CAPCOM Roger.

PAO this is Apollo Control, flight director Pete Frank has just gone around the room polling each of the flight controllers here, getting a status for the descent orbit insertion maneuver. All the lights came up green, every one says we're go and we'll be passing that go up to the crew shortly.

CAPCOM Apollo 16, Houston, everything looks good down here. You've got a go for DOI and the monitoring limits in the flight plan are good.

SC Okay.

PAO This is Apollo Control, we're coming up now on 9 minutes until loss of contact with Apollo 16. About 19 and 1/2 minutes away from the time the crew will be performing the descent orbit insertion maneuver. This maneuver of course performed behind the Moon we'll be out of radio contact and we'll get our first look at the results of that maneuver when they come back around on the other side of the Moon on their 3rd revolution. this burn is a very critical maneuver which must be performed in very pre--within very precise limits and particularly in the shutdown which the computer will signal. An overburn of slightly more than 1 second would place the spacecraft out of trajectory which would impact the Moon if it were not corrected. The normal procedure that the crew would follow in the event that they do get an over burn is to take out the over burn by using the reaction control system thrusters. We'll get about ten minutes

PAO of tracking as they come around the front side of the Moon on their third revolution and based on this information we'll give them a go no-go to stay in the trajectory resulting from the descent orbit insertion maneuver. If we don't like the looks of the trajectory based on ground tracking they'll be told to perform the bailout burn. And that maneuver is scheduled at 79 hours 22 minutes 8 seconds in the flight plan if it is required and would place the spacecraft in a safe 62 by--62.6 by 5.3 nautical mile orbit, again this is a contingency procedure only, and would be used only for some reason the descent orbit insertion maneuver was not as planned and the spacecraft was determined to be in an unsafe orbit. The guidance officer has just reported that the crew has switched to program 40, the program that they will use prior to performing the descent orbit insertion maneuver. And everything continues to progress very smoothly.

CAPCOM Roger, John.

END OF TAPE

SC Okay, Houston, we're going to do the gimbal
drive check.
CAPCOM Roger, we are watching.
SC Okay, the gimbals are trimmed.
CAPCOM Roger, copy.
SC and 5 0 9 is killed.
CAPCOM Roger.
CAPCOM 16, Houston, we're about 2 minutes from LOS.
SC Roger, 2 minutes from LOS.
SC About 12 from the burn.
CAPCOM Roger.
PAO This is Apollo Control. We've now had
loss of signal with Apollo 16. We'll be reacquiring the space-
craft in about 45 minutes. With a good maneuver we would
expect that acquisition time to be 79 hours 10 minutes 25 seconds
Without the burn we would be reacquiring about 3 and a half
minutes prior to that, or at 79 hours 6 minutes 46 seconds.
As Apollo 16 went around the corner of the Moon everything looked
good for the maneuver. The spacecraft was in an orbit of
169.4 by 58.1 nautical miles and the last velocity reading we
got was 5368 feet per second. We're now about 9 minutes 17 seconds
away from the scheduled time that the crew will be performing
descent orbit insertion. At 78 hours 25 minutes this is
Apollo Control Houston.

END OF TAPE

PAO This is Apollo control at 79 hours 6 minutes. We're about 4 1/2 minutes away from the expected time of reacquiring Apollo 16 on its third revolution of the moon. At which time they should have lowered their orbit to about 10 by 58 nautical miles. If, however, for some reason they did not perform that maneuver we would be reacquiring in about 30 seconds. The service propulsion engine on this particular spacecraft is consuming about 66 pounds of propellant per second of burn based on that when next we see Apollo 16 they should be about 1 600 pounds lighter and traveling about 136 miles an hour slower. The descent orbit insertion maneuver which was targeted to occur at the ground elapsed time of 78 hours 33 minutes 44 seconds was to have been a 24.2 second burn of the service propulsion system engine, and this would produce a total velocity change of 210.3 feet per second most of which would be retrograde giving us the desired orbit of 58.5 by 10.3 nautical miles. And we've passed the time of acquisition had they not performed the burn all continues to be quiet. We're now 3 minutes away from the expected time of acquisition with a good descent orbit insertion maneuver.

PAO This is Apollo control. We should be coming up on acquisition of signal now. And network reports that we have AOS.

SC Okay, Houston nominal burn, first DOI burn we ever had that was nominal.

CAPCOM Roger.

SC At least in our training.

CAPCOM Okay, we're stand by for your burn report.

SC Okay, Henry, it feels like if we had - we're clipping the top of the trees off, that's what it looks like. We got burn report of delta TIG zero. Burn time we got was 24.4 plus 2 ball 06. 2106 PGX trim attitude 001 272 003 so we did not trim. Residuals were plus .8 plus 0 plus .1 minus 2.3 Delta VC fuel 337 ox 346. Over.

CAPCOM Roger, 16 unbalanced?

SC SC Okay, it jumped up to 200 ...

END OF TAPE

CAPCOM -- 16 unbalanced.
SC Okay, it jumped up to 200 increase.
CAPCOM Roger, copy.
SC It never really stablized though, Hank.
CAPCOM Okay.
SC And a verb 82 last look thought we were at
10.9 perigee.
CAPCOM Roger, copy, 10.9.
SC But I don't think it really knows -- but
the MSFN really knows.
PAO That last comment was from John Young.
Earlier we heard from Charlie Duke reporting a nearly perfect
descent orbit insertion maneuver. Young reported that they're
on board. Reading show that they had an apolune of -- rather
a perilune of 10.9 nautical miles. The targeted was 10.3, but
again that's an onboard reading and we'll be tracking and get-
ting a reading here on the ground.
SC Houston, 16, it appeared to us that we got
an AUTO shut down.
CAPCOM Roger, Charlie, copy -- AUTO shut down.
SC You got any preliminary data, Houston?
CAPCOM Roger, John, the Doppler says stay, we're
waiting on the short arc.
SC Okay, thank you.
PAO John Young's question is in reference to
stay -- no stay -- that we'll be passing up from the Control
Center here in the event that tracking data -- we've got about
2 minutes of it on which the flight dynamics officer will
make his calculations -- in the event tracking data
showed that we did not get the desired orbit and we're in an
unsafe orbit, the crew has a maneuver on board that they would
perform to raise their orbit to a satisfactory level. This is
a so-called bailout burn which would be performed at 79 hours
22 minutes 8 seconds or about 6 minutes from now. All indica-
tions, preliminarily, are that everything is good. Assuming
that maneuver when as planned, and the orbit is as we would
expect, Apollo 16 should be at an altitude of about 19 nautical
miles above the lunar surface accounting for Charlie Duke's
earlier comment that it appeared to be right down among the
tree tops.
CAPCOM 16, Houston, your good on the short arc, you
have a stay, and we show you 59 by 10.7.
SC Roger, 59 by 10.7. Thank you sir.
CAPCOM 16, Houston, could you give us AUTO on the
high gain?
SC Roger. Henry, if you remember that little
real bright crater on the northern rim of Schbleegan that Stu
and Farook were talking about the other day, we happened to

SC see it right up close to us as we came by on this orbit -- and we got a couple of (garble) on it and that really is an unusual little guy. And it's really beautiful.

CAPCOM Roger, copy.

SC I probably get carried away with all of this, but we've done all kinds of things to see back here. It really would be nice to fly that kind of an orbit down low.

CAPCOM Roger.

SC And, we're pitching down to our landmark track attitude and this is my first chance to point the sextant at the surface, and the sextant is just as clear as a bell. It is beautiful. You can pick out little bitty features that are just as clear -- there's no fuzziness, and the telescope's the same way.

CAPCOM Hey, that's great[We ought to be able to get some good use out of that.

PAO This is Apollo Control. The landmark tracking Ken Mattingly is referring to is a procedure used on board the spacecraft to determine their orbit. It's also a procedure that will be used by Mattingly from lunar orbit to track the spacecraft on the surface of the Moon, hopefully, and allow scientist on the ground to compute a precise location for the landing site for the touchdown part of the Lunar Module. We now show Apollo 16 at an altitude of 13.8 nautical miles, continuing to drop down towards Pericyynthion. And the preliminary tracking data, the flight dynamics officer reported, shows an orbit of 59 by 10.7. We expect that that orbit will be refined somewhat as we get additional tracking that's based on the first look of the tracking data, but is very close to the desired orbit of 58.5 by 10.3 nautical miles.

END OF TAPE

SC Ah, Hank out to the, my side, out window
5 There was one crater here that you could see in
one section of it, it looked like some outcrop two-thirds the
way up the crater wall and some big blocks had rolled down the
into the crater floor and you could see the boulder track all
the way down.

CAPCOM Roger, copy. Can you locate that one.

SC Ah, wait a minute. No I'm pretty lost
right now. Let me see if I can figure it out.

SC Ken, while you're maneuvering there we'd
like to ask you what value did you put in your EMS and what
did you get on your EMS check?

SC Houston, 16, that crater I had I think was in
a series around MacLaurin and maybe a little bit further west
than that.

CAPCOM Roger, copy.

SC Ah, Hank, coming across the mare here it
reminds you of pitot static system calcs at Edwards.

CAPCOM Roger. You're really down low screaming
across huh?

CAPCOM 16, Houston, did you copy the question I
had about the EMS Delta V?

SC Houston, the Goclenius rille,
looks like large drop-ins with very subdued sides to them, no
outcrop at all apparent from my position.

CAPCOM Roger, copy.

SC And looking on up into the Gutenberg rille
you can see it cross one crater just climbs right across the
crater wall.

CAPCOM Roger.

SC So that's Gutenberg Sea. That's Gutenberg
Sea, Hank, and you can see the wall has down dropped into the
rille.

CAPCOM Roger, copy. How do you read Charlie?

SC I'm reading you 5 by.

CAPCOM Okay, a littler earlier I asked a question
about the EMS Delta V. Did you copy that?

SC Negative, we did not.

CAPCOM Okay, ah ----

SC It read minus 2.3.

CAPCOM Roger, we had a question here as to how
the EMS Delta V check came out and which value you loaded into
the Delta V counter?

SC Standby. Can I call you in a second on
that, Hank?

CAPCOM Sure thing.

SC It was like 1.8 at shut down because of the
drift in the EMS and I did a check and it came out to normal
and the bias was the same. I put in the Delta VT and the same
thing as we've used before, it didn't look to me like the bias

SC was in the less than half a foot per second.
CAPCOM Roger, copy. We were a little confused here because of the value that you had at the end there was somewhere in between what we thought it ought to be, depending on which setting you put in the Delta V counter.
SC Rog, it was about 1.6 or something like that at shut down. I'll have to look back at the flight plan.
SC Okay, Houston, the walls - the north wall of Capella has striations that are dipping eastward about oh, 60 degrees or so all the way across the north face.
CAPCOM Roger. Copy, Charlie.
SC Okay, and also Isidorius is the same thing.
CAPCOM Roger.
CAPCOM J2 should be on the horizon now, Ken.
SC Rog, we got the - it's right on the horizon. Still haven't picked up the target yet. Looks like it's tracking just about right, I have Theophilus going out of the field of view now.
CAPCOM Ken, you're coming up on about 30 seconds to TCA.

END OF TAPE.

SC At 30 seconds to TCA.
SC He has the target, Houston.
CAPCOM Roger.
SC Big old hill down the stream from where you
are going (garble).
SC Guess who is making them marks on
Gator crater right now?
CAPCOM I wonder who.
PAO Gator crater is about 700 yards across
one of the craters at the Descartes landing site. Ken
Mattingly obviously taking a landmark sightings on that crater
at the present time, and as Apollo 16 passes directly over
the landing site.
SC Now that's what I call OJT right there.
CAPCOM How did the landing site look through
the sextant?
SC You have to do that with the telescope,
Hank.
CAPCOM Roger.
SC I think that was the best high speed
pass I've ever made.
CAPCOM Roger.
CAPCOM 16, Houston. I have your map and pan
camera photo pads for 8035 whenever you are ready.
SC Okay, Henry, go ahead.
CAPCOM Roger, T start 080 3801 T stop 080 4604
and that same pad is good for the pan camera.
SC Okay, T start 080 3801 T stop 080 4604.
That'll be the same pad for both cameras.
CAPCOM 16, Houston, we'd like you to go on and get
in a SIM BAY attitude so we can get a DSE dump.
SC Wilco. Hey Hank, you want me to go ahead
and do this single jet authority or use couples to go to the
attitude?
CAPCOM Stand by. Ken, why don't you go
ahead and go couple then we can go single jet.
SC Okay, sounds like a good plan.
CAPCOM 16, OMNI charlie.
SC Hank, would you check on one thing
for me? Would you find out if this method I've been using
for reading out the maneuver times VERB 4 NOUN 1 is in any
way affected by or affects the use of program 509.
CAPCOM Will do, Ken.
SC Thank you, sir. And I got a couple of
minutes here if you would like to go over some of those
questions you had before now. I wasn't paying much attention.
CAPCOM Standby Ken, I think they got your answer
a while ago and it satisfied them, but I'll make sure.
SC Okay, I wasn't paying a lot of attention
I was trying to pick up that land mark.
CAPCOM Do you have any comments on the land mark

CAPCOM tracking, did it all go smoothly?

SC Well, except for the fact that those objects are perfect, that's really neat. The target area did not look as I anticipated. I think it's a function of the low sun angle, but it looked like to me they were far more rims around the craters than what - the impression I had looking at things on the models. And I did not pick up north or south they were in the shadows. So, I guess it's possible that I could have been on the wrong crater, but it sure looked like to me like I must have been on Gator.

CAPCOM Roger, copy.

SC It's still a problem in scaling when you look at something like that till you are sure that you had the right feel for it. But I think it's pretty obvious, and I think picking it up tomorrow will be relatively easy.

END OF TAPE

CAPCOM 16, Houston, could you bring up the high gain PITCH plus 35 YAW 290.

SC Say again your YAW number.

CAPCOM Roger, 290. And, Ken, there's no problem in ---

SC Okay, Hank, and we're about -- go ahead, Hank.

CAPCOM Roger, they say there is no problem in calculated maneuver completion time and it does not interfere with 509.

SC Okay, thank you. I've been avoiding using that.

SC Alright, we're about ready to go through solar monitor and tiedown release. You folks ready for us to do that?

CAPCOM Roger, we're ready to go, Ken.

SC Okay.

SC Okay, Houston, we released the tiedowns and the door and heard just a very tiny little sound on each of those activities.

CAPCOM Roger, we copy, Ken.

SC Hank, another piece of questionable data that've collected today is on our low pass on the backside there we got our color wheel out and we have 2 votes for number 17 and 1 vote for number 13.

CAPCOM Roger, copy.

SC And that's over on the backside just past (garble) and number 17 really isn't quite right, it's just the closest thing we had and the same comment applies to number 13.

SC Well I still say 13 was right on.

SC You'll never guess who voted for 13.

SC The grits have affected his vision.

CAPCOM That's probably what it is, John.

SC Right.

SC Hey, Hank, ask Stu who he believes.

CAPCOM Will do.

SC Okay, Hank, we have a SIM bay jett configuration and I'm going to start deploying equipment.

CAPCOM Roger, copy. Ken you want to keep us posted on what you're doing there with the switches?

SC Okay, I got the mapping camera door open, and the alpha cover door open, and the mapping camera's going out and we've just gone through 1 minute of extend time and I'm timing the first one.

CAPCOM Roger, copy.

SC I'll do the gamma ray mass spec boom sequentially afterwards so I can pay attention to the times. Okay, and I've got gray on the mapping camera extend and that was at 1 minute and 20 seconds.

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CAPCOM Roger, copy.

SC Okay, can you read me on VOX, Henry.

CAPCOM Roger.

SC Okay, that's the way we'll operate. I'm going to the gamma ray deploy at this time, I'm going to hold it for barber pole plus 2 seconds then OFF. Going to deploy. Deploy. Barber pole now 1, 2 OFF and it's gray. Gamma ray is coming to retract. Mark -- barber pole and it's gray. Okay, going to the mass spectrometer. Deploy -- mark -- barber pole 1, 2 OFF, mass spec to retract. Mark -- barber pole-- OFF. Okay, they're both in the retract position and everything looks normal. The X-ray is coming on -- mark. I've completed the gamma ray and mass spec boom deployment and retraction and I'm ready to go ahead with the mass spec deploy- if that's okay with you?

CAPCOM Roger, go ahead.

END OF TAPE

SC I've completed the gamma ray and mass spec boom deployment and retraction and I'm ready to go ahead with the mass spec deploy, if that's okay with you?

CAPCOM Roger, go ahead.

SC Hey, It's deploy on the mass spec and I'm timing it.

CAPCOM Give us auto on the high gain, 16.

SC 5 seconds to stop. Okay, it's off on the mass spectrometer, and gain auto.

SC Okay, Hank, you got the mass spec out to 8.4 feet.

CAPCOM Roger, looks good down here.

SC Laser altimeter is coming on. Mark and can I go ahead and put the mass spec experiment on without waiting the 3 or 4 minutes?

CAPCOM Standby. Roger, go ahead.

SC Okay. Mass spectrometer experiment is coming on, Mark. The ION source is going to standby. Mark it.

SC Can you tell how the Laser is doing yet Hank?

CAPCOM Standby, Ken, we'll take a look. Laser looks good, Ken.

SC How outstanding.

PAO This is Apollo Control at 80 hours 12 minutes. The Guidance and Control Officer reports that from looking at the replay of data from that descent orbit insertion maneuver performed at the end of the second revolution, he reports that the engine appeared to perform normally in every respect and we're currently showing Apollo 16 in an orbit 58.6 nautical miles by 9.9 and we expect that will continue to be refined somewhat. Ken Mattingly has completed a series of exercises that deploy certain of the experiments in the service module scientific instrument module bay, the SIM bay experiments, the gamma ray and gamma ray spectrometer and mass spectrometer on 25 foot and 24 foot booms respectively were extended to their full out positions and then retracted, to checked the operation. Mattingly then extended the mass spectrometer to about a third of it's length and turned it on. It's about 8.4 feet out from the side of the service module now on it's retractable boom. And also turned on the laser altimeter. The mass spectrometer is designed to gather information on the nature and composition of the lunar atmosphere; also to detect contaminants in that atmosphere. Such things as the volatile products --

CAPCOM 2 minutes from LOS.

SC Alrighty, see you in a little while.

CAPCOM Roger. Over.

PAO The mass spectrometer detects such things as the volatile products given off by volcanoes, should any of those happen to be active around this time, we also detect water vapor should that exist in the lunar atmosphere. The other experiment activated by Mattingly was the laser altimeter. You heard him ask how that was performing. A report from the orbital science officer here was that it appeared to be functioning normally. This device measures the spacecraft altitude above the lunar surface and is correlated with panoramic camera photographs obtained of the lunar surface. Putting these two bits of information together - the photo and the laser altimeter data - it's possible to determine within about 6 feet the elevation of lunar surface features. We are now about 45 seconds from losing radio contact with Apollo 16 as the spacecraft passes behind the Moon on it's third revolution. We'll be reacquiring - reestablishing radio contact at the beginning of the fourth revolution in about 45 minutes.

SC Houston, 16, do you read?

CAPCOM Roger.

SC Okay, Hank, I'm up with the biomed. Take a quick look at it.

CAPCOM Looks good.

SC Okay, Since we are going to put on our LCG's tonight, I don't bit put on the --

END OF TAPE

PAO This is Apollo Control at 81 hours 4 minutes we're standing by now to regain radio contact with Apollo 16 now in it's fourth revolution of the Moon. This will be the last front side pass prior to the time the crew begins their scheduled 9 hour rest period. And should be a relatively quiet period. And the flight dynamics officer has just reported the -- that their latest tracking shows the spacecraft to be in an orbit of 58.6 by 10.6 nautical miles. As a result of that descent orbit insertion maneuver. We're about 10 seconds now from regaining radio contact. We've had acquisition of signal.

CAPCOM Apollo 16, Houston.

CAPCOM Apollo 16, Houston, how do you read?

SC You're 5 by, Hank.

CAPCOM Roger. Our data down here we worked on during the backside shows you're at 58.8 by 10.6.

SC Okay, and while we were on the backside we had a couple of main B interval lights.

CAPCOM Roger, copy. You want to tell us about it?

SC Stand by, yeah, was--when Ken, was messing around with the SIM bay and he'll fill you in.

CAPCOM Okay.

SC And we got a little behind on this sequence already Hank, but as soon as I turned the -- had the mapping ON it worked fine. I turned the pan camera ON and as soon as I went to operate on the pan camera we got main B interval, so I turned it back to stand by and left it there Charlie said he saw about 25 volts on main B and concluded I'd wait and let you take a look at it. And then we got another main B interval some 5 minutes or so later and it again was momentary, by the time we looked at it all looked pretty normal. Only we checked the fuel cells regulator pressures, they looked good and I really don't have any idea what might have caused it.

CAPCOM Yeah, all the things we could check, look okay.

SC Hank, we got -- it might not even be a small anomaly but fuel cell 3, the H2 flows running a little bit higher than the O2 flow, but the regulated pressure looks fine to me. But the other 2 fuel cells H2 and O2 match.

CAPCOM Roger, we copy, Charlie.

SC My guess is when you dump the DSE the whole story will be right on there probably.

CAPCOM Okay, check Tom.

SC When you get the DSE translated it'll probably tell you what happened.

CAPCOM Roger we copy.

SC Hank, you really can see both the mass spec and the gamma ray booms deployed.

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CAPCOM Rog. understand you can see them both.
SC That's affirm. Looks like a couple of
feet of the boom is about all you can see.
CAPCOM You really got us puzzled with this under
volt now, because the pan camera runs off the main A.
SC Yeah, we noticed the same thing. It --
you know may not be rational --

END OF TAPE

CAPCOM ... this undervolt now because the pan camera runs off the main A.

SC Yes, we noticed the same thing. You know it may not be rational, but it just seemed like that was the - I touched one switch and got a main undervolt so I took it back off again. Decided to let you think about it before I added anymore. Possible that it doesn't have any connection.

CAPCOM Roger.

SC I still have the power on it, Hank. I've got it in stand by and power on.

CAPCOM Roger, copy. And Ken, like to verify is your non essential buss on main A or main B?

SC That's main A.

CAPCOM Roger.

SC And Hank, last night we - I think we got verification that we could wear the LCGs to bed tonight and be all ready to go in the morning.

CAPCOM That is affirmative.

SC Okay. Anybody thought anymore about my suit?

CAPCOM We thought about it and smoked it over and we kind of think maybe we ought to do nothing unless you have some real bad trouble tomorrow.

SC Like if we can't get it zipped. Okay, can we use my pliers on it to pull the zipper closed?

SC Houston.

SC Houston, 16. Do you read, over.

CAPCOM Roger, reading you 5 by 5 John, go ahead.

SC Okay, if I have trouble closing it can I use my pliers to get a better grip on it to pull it closed? Because it took me the better part of 20 minutes the other day to do it, and it usually takes about 2. There's a place on there in the small of Charlie's back where that thing has just separated too far apart on the restraint zipper for me to pull it closed easily. When he gets on the LCG the FCS and UCD bulk in there the suit is going to be farther apart than it was yesterday.

CAPCOM John, we talked to Dave about that and he said the big problem is that you can't arch your back in zero g as well. He had a lot of trouble too, but on the Moon in 1/6th g he had no problem at all because the gravity helped him arch his back. Does that sound like the problem you just couldn't get arched back that far enough to do it?

SC Got me there, it looked like he was arching as much as he usually is. But, you saying that if I can't do it in zero g we go on down to the Moon and try it in 1/6th g?

CAPCOM That's sounds pretty good, John. We did

CAPCOM look at a back up procedure here but it's a long thing that involves using a needle and pulling things together like your sewing.

SC Okay, Hank I think to give us every benefit of the doubt that I will not - I don't plan to wear the SCS probably tomorrow I'll just use the LCG and UCD.

CAPCOM Roger, understand and could you give us AUTO and a high gain.

SC There you go.

SC Hank, also we would like to get permission to fill the drink bags tonight and save a few minutes also if you think that's gonna be alright.

CAPCOM Roger, go ahead and do that Charlie.

SC Alright.

CAPCOM Ken, we can't find any connection between the pan camera and main bus A and we were wondering - or main bus B, and we were wondering if when you got the second momentary one undervolt were you moving any switches at that time?

SC That's negative. They were both momentary main bus undervolts.

CAPCOM Roger, the first one was a momentary also.

SC It could be or it could be that the sensor is triggering at the wrong level. It could be that the sensor shifted up to something that looks reasonable. I wouldn't object - we still got the pan camera power on I wouldn't object to it to operate for a second and back off go ahead and use a couple of frames just to let you watch it.

CAPCOM Stand by, Ken.

SC Houston, 16.

CAPCOM Go ahead.

SC Is Tom satisfied with his glycol evap out. We've got off scale high here.

CAPCOM Stand by a minute, Charlie.

END OF TAPE

CAPCOM Standby a minute, Charlie.
CAPCOM 16, Houston, you're coming right against
the top of the scale you're still okay, you should now monitor
RAD out.
SC A RAD out is 75.
CAPCOM Roger.
CAPCOM 16, Houston, talked with the suit people,
they don't want you to using the pliers on the zippers.
SC I'm just using it to get a better grip with,
not to pull the zipper, just to pull with.
CAPCOM Their concern is over sideload, John, they're afraid
for you to use the pliers.
SC Okay.
PAO This is Apollo Control at 81 hours 30 min-
utes.
CAPCOM Uh, we would like to talk to you a minute
about this docking latch, if you're free.
SC Go ahead.
CAPCOM Okay, we've got a real long procedure here.
I don't think you need to copy it all down. Let me just read
it through to you once, and kind of maybe discuss it as we go.
What we want to do is kind of get a look at the thing tomorrow
and see what the condition of it is. After you disconnect the
LM umbilical, we would like for you to open the orange LM um-
bilical connector cover, and inspect the roller pawl, The roller
pawl, we hope, is engaged in the detent so we would like to find
out if it's in the detent, or is it free, or sticking up, and you
can do that by looking in the side of the latch after you remove
that umbilical connector cover. Is there any question on that?
SC Yeah, I'm not sure I know what you're look-
ing for.
CAPCOM Okay, when you look in the side there --
SC I'm not at all sure what the roller pawl is.
CAPCOM Okay, the roller pawl is on the far left side
of the latch, behind and above the auxiliary release button.
And it can be identified by the roller on the tip of the pawl.
The pawl is just a little arm that sticks out and it's got
a little roller on the end of it that rides on the cam that
has the detents in it.
SC Okay.
SC Do you want to do this before we unlock it?
CAPCOM That's affirmative. And it best be done
tomorrow before you get your helmet and gloves on, of course.
Just take a look at it while -- perhaps while they're bringing
the LM up. And if you find after we get the condition of that
if the roller is down in the detent like we suspect that it is,
when you remove the yellow probe umbilical cover on the right

CAPCOM side of the latch, we would like you to look in the right side in there and at the bungee bell crank mechanism to see if there's any foreign object damage or anything wedged up in there.

SC When you say remove the cover do you mean physically remove it from the spacecraft, or just open it up and look underneath it.

CAPCOM Just open it up and look under there, Ken. And this is mainly -- these two steps is just an inspection we just like to verify the condition of the rollerpawl and also the bell crank mechanism on the other side. Has nothing to do with the latch, but at least it'll give us an idea of what's wrong inside -- if there is anything. It's not going to help you in any way to prepare for unlocking it. To unlock it -- after you've looked at these two things, we would like to know if the latch handle requires force to cock the latch on the first stroke -- and the second stroke if required. In other words, if the handle comes away real easy, as you recall, then the thing is already cocked. More than likely, it is going to take some force and we would like to verify how this works. And if it should require force pull it down and then we want to see that the hook comes out to inboard approximately 16 degrees. If the hook doesn't come out, then all you got to do is pull down on the handle to the full cock position, and hold it and then just reach up and grab the hook, and pull it inboard about 16 degrees and the hook should stay there. And then you just proceed with normal undocking.

SC Okay, so the kind of thing you want me to look for are information only. Is that affirmative?

CAPCOM Right, it would help the guys down here to try to understand what really happened to the latch. We kind of suspect it only got one cock. But if you look in there, and look for the roller pawl on the left side and look at the bell crank on the right side -- at least that would tell us that nothing is jamming it and that the roller pawl is in the right direction -- right place. Operationally though, prepare for undocking -- what it really amounts to you just use the normal procedure -- you pull the latch handle down and cock it if necessary, and if the hook doesn't come back just hold the latch handle all the way down to the full cock position and pull the --

END OF TAPE

CAPCOM operation is to prepare to undock and what it really amounts to you just use the normal procedure - you pull the latch handle down and cock it if necessary and if the hook doesn't come back, just hold the latch handle all the way down to the full cocked position and pull the hook back.

SC Okay, I just wanted to keep in mind what it was I needed if the time gets crowded.

CAPCOM Rog. The other things - if there is any question on cocking. The only thing you have to do there is just pull it down and get the hook out of the way. Do you have any questions on any of that.

SC Ah, Hank, we just (garbled).

SC Not, not right now. Maybe you want to get in there and look at it I'll call and ask you for some clarification or something tomorrow. But I think I know what you mean.

CAPCOM Okay.

SC Ah, Hank, as we came up towards the landing site, in that terrain - the general terrain to the east of us appears to be frothy vesicular looking type terrain, real (garbled) looking, at this scale. Over.

CAPCOM Roger, we copy, Charlie.

SC I'd say that was the Descartes, it has that appearance to it to me.

CAPCOM Roger.

SC And do you have this LM DAP load for us, then TEI?

CAPCOM Roger, we're working on those pads now.

CAPCOM Charlie, we'd like to get a Bat B charge going.

SC Okay, Bat B charge going on.

SC Bat B is charging.

CAPCOM 16, Houston, I have your TEI 12 19 block data.

SC Okay, standby.

SC Okay, go ahead.

CAPCOM Okay, TEI 12 SPS G&N 39817 plus 061 plus 119 097 45 5309 plus 31632 plus 10403 minus 02346 181 080 020 rest of the pad is NA. The set stars are the same as for DOI. Won't repeat unless you want. Ullage 2 jets 17 seconds, other remarks burn, undock, assumes no circ. Longitude Moon at TIG minus 171.47. Landing site REFSMMAT.

SC Rog. TEI 12 SPS G&N 39817 plus 061 plus 119 097 45 5309 plus 31632 plus 10403 minus 02346 181 080 020 NA Sirius and Rigel and information is same as DOI 2 jets 17 seconds, burn, undock assumes no circ, longitude of Moon at TIG minus 171.47, landing site REFSMMAT.

CAPCOM Good read back and are you ready for TEI night data?

SC You speak.

CAPCOM Roger, TEI 19.

SC You speak.

CAPCOM Roger. TEI 19 SPS G&N 39445 plus 061 plus 115 111 31 4981 plus 29094 plus 07853 minus 02240 181 100 017 set stars same as DOI, 2 jets 17 seconds. Other burn undocked assumes circ lamda Moon at TIG minus 16009 end of pad. If you'll give us ACCEPT we're ready to uplink.

SC Rog, you have it. And read back TEI 19, SPS G&N 39445 plus 061 plus 115 111 31 4981 plus 29094 plus 07853 minus 02240 181 100 017 Sirius and Rigel 2 jets 17 seconds burn undocked assume circ Lamda at TIG minus 1609.

CAPCOM That was 16009.

SC Rog. Henry can I assume that the mission timer is in sufficient sinc and that we don't need to any updates there and that the REFSMMAT is good as is?

CAPCOM That's affirmative.

SC Thank you sir.

SC Have you got the LM DAP stuff, Hank?

CAPCOM Roger, we've got it and we're uplinking now we're also loading your EMP 509 and I have your DAP if you're ready to copy.

SC Go ahead.

CAPCOM Correction on that, it's not 509 it's the jet monitor. Okay LM DAP. LM weight 36673 CSM weight 39329. Checklist DPS gimbal trims are good, no trim required.

SC Rog, reading 36673 39329 and the gimbals are good as is.

CAPCOM It's a good read back, Charlie, I have a change to your LM Timeline book on page 1.

SC Stand by. Is it the timeline or activation?

CAPCOM Timeline book.

CAPCOM It's a change to your undocking attitude, Charlie, it says timeline book.

SC Okay, just had to get it out, go ahead page 1.

CAPCOM Okay, change undocking attitude to 0 284 064. The reason for this is because the docking index -

SC Rog, 0284 -

SC Rog, 0284 064.

CAPCOM Rog, that's because of your docking index angle of minus 3 and 1/2 degrees.

SC Copy.

CAPCOM And I have some flight plan changes for you.

CAPCOM Apollo 16, Houston, we'd like to verify the position of the 02 tank 50 watt heaters on panel 226.

SC They are OPEN.

CAPCOM Roger, copy they are OPEN. Charlie, are you ready to copy the flight plan changes?

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SC

What kind of flight plan, LM or CSM type?

CAPCOM

Roger, they're CSM if you want to get then

Ken, they're for tomorrows activities.

END OF TAPE

SC LM or CSM type?
CAPCOM Roger, that's CSM, if you want to get them
Ken, their for tomorrows' activities.
SC Okay, I'm ready.
CAPCOM Okay, the first one is at 96:34.
SC Go ahead.
CAPCOM Okay, there's a VERB 48 there change R-1
to read 10102.
SC Okay, 10102 for VERB 48 or 1 at 96:34.
CAPCOM That's correct.
CAPCOM At 96:39 write in load EMP 509 leave ON
through gimbal drive check for circ.
SC Okay, at 39 load 509 and leave through
circ gimbal drive check.
CAPCOM That's correct. The next change is at 97:15.
SC Go.
CAPCOM Delete the VERB 48.
SC Okay, delete the VERB 48 at 97:15, that's
because we'd already set it, affirmative?
CAPCOM That's affirmative. And that also pre-
vents you from activating Saturn DAP. Okay at 97:44, right
after -- right prior to the VERB 49 maneuver there, put in load
DAP, VERB 48 10101 X1111.
SC Okay, you want to load VERB 48 10101 and
then X1111. After the circ burn and ahead of the VERB 49
maneuver.
CAPCOM That's affirmative and Ken, the computers
yours the E member programs loaded.
SC Alright sir, thank you.
CAPCOM Okay, next change is at 98:32 prior to
the comm check there put load EMP 509.
SC (garble) comm check load 509.
CAPCOM Roger and down about 98:44 after P00 and
terminate EMP 509, after the P-24 is complete.
SC Okay, I'll terminate 509, between P00 and
loading VERB 48.
CAPCOM Roger. The next change is at 100 hours
32 minutes, load EMP 509.
SC Okay, at about 100:32 load 509.
CAPCOM Roger, and about 100:43 terminate EMP 509,
after P-24 complete.
SC Okay, will terminate 509 after P-24.
CAPCOM Okay, Ken, that's it on the flight plan
changes. I hate to bring this up again but they've got a
change here for your SPS burn cue card.
SC Alright. What might that be.
CAPCOM Well we had this starting this thing 20
minutes early before so that we could help you, fire the LOS,
and we're convinced that you don't really need that much time
and what we think you ought to do is get the gimbal drive test

APOLLO 16 MISSION COMMENTARY 4/19/72 CST 21:45 GET 81:50 275/2

CAPCOM started the main bus is on about 8 minutes early rather than 6 minutes, so the change is to where we had you 40 minutes or minus 20 minutes, is to change that to 52 and minus 8.

SC Okay, do I dare use my ink pen this time?

CAPCOM I hope it's good for the rest of the bars now if we change that to 52 minutes and minus 8 minutes.

SC Okay, it's no sweat. Thank you.

CAPCOM Okay, and the next one it will become 41 minutes and minus -- correction 53 minutes minus 7.

SC Okay, 53 and minus 7 and 52 and minus 8.

CAPCOM Okay, now earlier we had deleted that tape recorder

END OF TAPE

CAPCOM Okay, now earlier we had deleted that tape recorder high bit rate line there and added it back on the back page. And I guess now we need to move it back.

SC Okay, would you settle for minus 8 so I can just leave it where it is?

CAPCOM Roger, that's good enough. Just do it there and delete it from the backside of the card.

SC Okay, we'll do that. Hank, are we going to end up with temperatures that are low enough or would you like for me to manually set this temp in valve to a little lower temperature.

CAPCOM Are you talking about the oxidizer pressure, Ken?

SC No sir the manual temp in and I'd like all of them.

CAPCOM Oh, that EECOM advises that looks pretty good now.

SC Okay, is it going to get too cold on the dark side?

CAPCOM Stand by a minute.

CAPCOM Ken, ECON says that the present setting should keep you in good shape.

SC Hank, I guess I would like to run it cooler to get the cockpit a little cooler if that isn't going to cause any other problems.

CAPCOM Stand by a minute, Ken.

CAPCOM Casper, Houston. We'd like to get the pan camera turned off.

SC Okay, you just want to take and turn the power off.

CAPCOM Roger, we were trying to look around it, but we got pretty high loads on the spacecraft now and we're getting close to LOS and it's not going to be time to exercise it.

SC Okay, we'll just turn it off, then .
Okay, Hank we've got the pan camera power off.

CAPCOM Roger, Ken and did you happen to notice the retrack time on the mapping camera.

SC Yes sir I meant to get that in. I thought it was excessive. In fact I thought it had maybe stuck it was about 3 mintues.

CAPCOM Roger, we copy.

SC And Hank, I got some film status to give you if your ready for that.

CAPCOM Stand by. Go ahead.

SC Say again.

CAPCOM I'm ready to copy, Ken.

SC Okay on magazine victor we're up to frame number 8 sierra sierra frame number 13 tango tango 04.

APOLLO 16 MISSION COMMENTARY 4/19/72 CST 21:53 GET 81:59 276/2

SC November November 36.
CAPCOM Roger copy, victor 8, sierra sierra 13,
tango tango 04, november november 36.
SC That's correct, sir.
CAPCOM 16, Houston. For evenly distributed the
electrical loads when you get on the backside after LOS we
would like for you to take telecom group 2 to AC 1.
SC Okay, telecom group 2 to AC 1.
CAPCOM Roger, that's after LOS. And in regard
to the mixing valve you could adjust that for an evap out
temperature of 49 degrees and you ought to be okay.
SC OK. Is that 49 degrees, the coldest
temperature, or just how did you -
CAPCOM If you adjust it right now to an evap -
SC Okay, Okay, right now for 49.

END OF TAPE

CAPCOM Apollo 16, Houston, we would like to get a
E MOD, if we can.

SC On the way.

CAPCOM Roger.

CAPCOM And 16, Houston, make sure you get the com
set up right in your pre-sleep checklist here, or inco says
they won't be able to command the thing right and we'll have
to wake you up next time.

SC Say again, Hank.

CAPCOM Roger, they're admonishing me to tell you
to be sure you follow the checklist on setting up the com pre-
sleep.

SC Rog, we'll do that.

CAPCOM Apollo 16, Houston, we're about 2 minutes
from LS.

PAO This is Apollo Control. We've lost radio
contact now with the spacecraft as it passes behind the Moon
on the fourth revolution. The crew is scheduled to begin a
nine hour rest period while on the backside of the Moon, and
we would expect to hear no further word from them until the
end of that rest period. During this frontside pass on the
fourth revolution, there were 3 major items covered. I'll try
to run through those 3, and summarize what to us appeared to
be the major points. On first reacquiring contact John Young
reported that they had seen 2 main bus B undervolt conditions--
as he described it these were transitory events main bus B
voltage dropping briefly to the point to where it triggered
a master caution and warning alarm. Normally, main bus B,
which is one of 2 main busses supplying electrical power to
the equipment aboard the Command and Service Module, operates
at about 27 to 28 volts under load. The master caution and
warning is set to trigger at 26.25 volts, if the voltage drops
to that level. And in replaying the data tapes, we saw the
voltage drop to about 26.14 volts. The data tape replay, how-
ever, showed no indication of a problem with any of the elec-
trical equipment. One sometimes suspects momentary current
overloads -- a heavy drain of current which would then drag
the voltage down, but there was no indication that any of
the equipment was malfunctioning. The one thing the crew
described that appeared to be coincident with the voltage drop,
was the operation of the pan camera. A, however, simultaneous
data on this camera, when it was operating, showed that the
camera was functioning normally. At this point after looking
at all of the data, and considering the loads on both main bus
A and main bus B, one supposition is that we had a coincident
series of events, which momentarily overloaded main bus
B. Such things as heaters coming on simultaneously at the
same time we had a heavy current drain for the SIM bay acti-
vities. If this is, in fact, the case, it can easily be

PAO remedied by transferring some of the load to main bus A -- a simple reconfiguration. And that appears to be the most likely cause of the main bus undervoltages, in which case we would have no particular problem. One other thing that was discussed, was the suit problem. Going back to the beginning of this one -- Charlie Duke reported last night on entering the Lunar Module suited -- getting suited up and getting into the Lunar Module that John Young had some difficulty getting the suit zipped. The restraint zipper closed across the back of the suit -- this zipper does not maintain the pressure of the suit, but is a load carrying zipper that holds all the layers together on the outside of the pressure layers. And Duke mentioned in order to minimize the problem of getting the suit zipped tomorrow, he would like to leave off the fecal containment system. In zipping the suit up the first time both the fecal containment system and the liquid cool garment were not worn. Duke's feeling was that once these additional items were added underneath the suit it would increase the problem of closing that zipper. And we gave him a go ahead to leave the fecal containment system off, and recommend that he make an attempt to get the suit zipped using the normal procedures. John Young suggested the possibility of using a pair of pliers that they carry on board to assist in it, a recommendation at this time is that not be done. Dave Scott, who was by earlier in the evening, discussed with the flight controllers a similar problem that they encountered, although apparently not quite so severe, on Apollo 15. And Dave's analysis of that situation was that in zero G it's more difficult to arch one's back without gravity to help. Arching the back is a method that is used to reduce the strain across the zipper so that it is easier to get it closed, and it was suggested to Charlie that he make every effort to brace himself and get the back arched in order to make the job a little easier of getting the zipper closed. And we do have a backup procedure that'll be discussed with the crew to assist in closing that zipper. If the problem arises tomorrow when they're preparing to get into the Lunar Module and suiting up. Also CAPCOM Henry Hartsfield discussed a procedure with Ken Mattingly for checking out the docking latches. One of the 12 docking latches has apparently not latched down firmly onto the LM tunnel docking ring. This causes no particular concern, but there is some interest in determining why the latch did not close. Mattingly, last night, was asked to cycle a device that is connected with the latch. This gave the flight controllers an indication that the latch, which is cocked prior to docking, was not fully cocked, and therefore, did not latch fully. There is also the possibility that the latch is broken. In order to

PAO determine which of these is the case, Mattingly was given a series of procedures to follow, of which we hope will provide some information and shed some light on whether the latch simply was not fully cocked, or whether it is broken or has malfunctioned in some other way. This is primarily of concern for future flights. It doesn't have a direct bearing on this flight, it's felt that the latch will in no way effect undocking and since only 3 of the 12 latches are required for a firm hard docking, there is no particular concern that it will in any way effect the docking either. As mentioned previously, we expect to see the crew asleep when next we reacquire the spacecraft. That will be about 40 minutes. And as Apollo 16 went around the corner on the fourth revolution, we showed it in an orbit of 58.7 by 10.4 nautical miles. At 82 hours 19 minutes into the flight of Apollo 16, this is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control at 82 hours 58 minutes
We're about one minute away from regaining radio contact with
Apollo 16, the spacecraft now in it's fifth revolution of the
Moon. And we expect the crew is in their sleep period at this
time. They're scheduled to have a 9 hour rest period, beginning
about 30 minutes ago, while they were on the backside of the
Moon. However we will have the circuits up live in case they
haven't begun their sleep period and have any last minute items
to discuss with Mission Control, before beginning the rest period.
And network has just called out AOS, acquisition of signal, and
we see all of the data now suddenly come alive on the television
display here, the telemetry data from the spacecraft, we won't
plan to put in a call to the crew, however we will be standing
by should we get a call from them.

PAO And the communications engineer says that
the spacecraft appears to be configured for sleep, the high
gain antenna is in the proper position, the voice sub carrier
is turned off, so we'll presume that the crew has begun its'
rest period.

END OF TAPE

PAO This is Apollo Control at 83 hours 35 minutes. We now have a little under thirty minutes of acquisition time remaining before Apollo 16 goes around the corner on the fifth revolution of the Moon and we lose radio contact. And it has remained quiet, and no calls from the crew, and relatively little activity here in the Control Center - primarily monitoring systems and preparing for tomorrow's activities. We're continuing to watch the Spacecraft orbit change gradually. We're now showing an apogee of 58.8 nautical miles, and a perigee, or pericynthion more correctly, of 10.5 nautical miles. This crew rest period is scheduled to last for about 9 hours. And the crew is to be awakened at about 91 hours 30 minutes - about 8 hours from now.

END OF TAPE

PAO This is Apollo Control at 84 hours 3 minutes now into the flight of Apollo 16. And nearing the end of the fifth revolution around the Moon. Now we have about 1 minute 45 seconds before we loose radio contact with the spacecraft. We've heard nothing from the crew. They're in their rest period. And all spacecraft systems appear to be functioning properly at the present time. We show Apollo 16 in an orbit 10.4 nautical miles by 58.8. And at this time in Mission Control we're in a mist of a shift handover. Flight Director Gene Kranz and his team of flight controllers coming on to replace the Pete Frank team. Spacecraft communicator on the up coming shift will be astronaut Donald Peterson. And we do plan to have a change of shift briefing. We expect that that will start in about 15 minutes. The briefing will be in the MSC News Center Briefing room. At 84 hours 4 minutes this is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control Houston at 84 hours 52 minutes into the Mission. We're a little more than 20 seconds away from scheduled time of acquisition of Apollo 16. Now on its sixth revolution around the moon. We presently show an orbit of 58.8 nautical miles by 10.6 nautical miles, meanwhile in the Mission Control center, we have had a shift changeover of flight control teams. The white team of flight controllers headed by flight director Gene Kranz is now aboard. The surgeon reports that he has two of the crew members on his biomed, he reported that lunar module pilot Charlie Duke went to sleep rather rapidly, whereas command module pilot Ken Mattingly was still awake at loss of signal. The crew of Apollo 16 is now in their rest period, however, we'll leave the line up on this front side pass in the event that we do have conversation with the crew of Apollo 16. Our CAPCOM on this shift is astronaut Don Peterson. We have acquired data from Apollo 16 and we'll continue to monitor. This is Apollo Control Houston at 84 hours 54 minutes ground elapsed time.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4-20-72 GET 85:20 CST 00:47 MC-282/1

PAO This is Apollo Control Houston at 85 hours 19 minutes ground elapsed time. We have some 40 minutes remaining on this front side pass for Apollo 16. Now on its 6th revolution around the moon. We've had no communication with the crew, presently in their rest period, however, we will continue to leave the line up during this front side pass. We show Apollo 16 traveling at a velocity of 5546 feet per second. Current altitude, 11 nautical miles, the spacecraft is presently in an orbit of 58.8 nautical miles by 10.5 nautical miles. Spacecraft weight in orbit at this time 76 109 pounds. At 85 hours 20 minutes, continuing to monitor, this is Apollo Control Houston.

END OF TAPE

APOLLO 16, MISSION COMMENTARY, 4-20-72, CST 01:13, GET 85:20 283/1

PAO This is Apollo Control Houston at 85
hours and 59 minutes ground elapsed time. At this time
we've had loss of signal with the Apollo 16 spacecraft as
it passes above the back side of the Moon. We will take
down our line at this time and at 85 hours and 59 minutes
this is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control Houston at 86 hours 46 minutes into the mission and we're coming up now on acquisition with Apollo 16 now on its seventh revolution around the Moon. Apollo 16 is presently in an orbit of 58.9 nautical miles by 10.6 nautical miles. We expect no conversation with the crew on this front side pass. Young, Duke, Mattingly now well into their rest period. We will leave the line down on this front side pass but we'll bring it up should any conversation develop. We do now have acquisition with Apollo 16 and are receiving data. At 86 hours 47 minutes ground elapsed, this is Apollo Control Houston.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/20/72 CST 03:45 GET 87:52 MC-285/1

PAO This is Apollo Control Houston at 87 hours 52 minutes ground elapsed time. Apollo 16 has now passed out of acquisition range. We have loss of signal with Apollo 16 as it passes above the back side of the Moon on it's 7th revolution. We show orbital parameters of 58.8 nautical miles and 10.4 nautical miles. We had no conversation with the crew of Apollo 16 during this front side pass. The crew is presently in a rest period. We're at 87 hours 53 minutes and this is Apollo Control Houston.

END OF TAPE

APOLLO 16 MISSION COMMENTARY, 4/20/72, 04:34 CST 88:40 GET, MC-286/1

PAO This is Apollo Control, Houston, at 88 hours 40 minutes into the mission. We're standing by now awaiting acquisition with the Apollo 16 spacecraft on its eighth revolution around the moon. We presently show an orbit of 58.9 nautical miles by 10.6 nautical miles. The flight surgeon here in Mission Control reports that Command Module Pilot Ken Mattingly and Lunar Module Pilot Charles Duke were sleeping very well when he looked at their data through the last pass. We are now receiving data from Apollo 16. The spacecraft has been reacquired. We're at 88 hours 41 minutes into the mission and this is Apollo Control, Houston.

END OF TAPE

PAO This is Apollo Control Houston at 89 hours 46 minutes into the flight. We now show Apollo 16 with an orbit of 58.8 nautical miles by 10.4 nautical miles. The Apollo 16 Spacecraft has passed out of range on its eighth revolution around the Moon. On this past frontside pass, we had no conversation with the crew, still in their rest period. Our wake-up clock here in Mission Control shows that the crew has 1 hour and 43 minutes of sleep time remaining before the wake-up call. We're at 89 hours and 47 minutes, and this is Apollo Control Houston.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/20/72 CST 6:27 GET 90:33 MC-288/1

PAO This is Apollo Control Houston at 90 hours
34 minutes into the mission. We now show Apollo 16 in an
orbit of 58.9 nautical miles by 10.5 nautical miles. We're
coming up on acquisition of the spacecraft on this the 9th
revolution. Because we will wake up the crew at some point
on this front side pass. We will leave the line up alive
and at 90 hours 35 minutes this is Apollo Control Houston.
We're acquiring data now.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/20/72, 6:28 AM CST 90:34 GET 289/1

PAO This is Apollo Control, Houston, at
91 hours 24 minutes into the mission. We're standing by
now awaiting a wake-up call by Capcom Don Peterson to the
crew of Apollo 16.

PAO We show Apollo 16 presently with an
apolune of 58.9 nautical miles and a perilune of 10.4 nautical
miles.

END OF TAPE

CAPCOM Apollo 16, Houston.
CAPCOM Apollo 16, Houston.
SC Are you down there this morning, Houston?
CAPCOM Just fine. How are you 16?
SC (GARBLED)
CAPCOM Roger. Got about 3 short items and SIMBAY status, if your ready.
SC Okay, can we hold off on the SIM bay status and I'll copy you 3 short items.
CAPCOM Roger.
CAPCOM Okay, the first one is based on our evaluation, your potassium levels are running a little low, and we'd like to recommend that you drink some orange juice this morning. Also, you've got a long day ahead of you so we'd like to recommend that you eat a bit more food. Second item is terminate battery Bravo charge. The third item is terminate the jet-on-monitor.
SC Okay, Don. Okay, Don. Number one I understand you comment about the potassium low and all that jazz, we're just finishing up breakfast and I think we've eaten almost everything that the lemies has to eat, and we've been drinking all the drinks every day, and if we get a chance, we'll try to get some more, get another juice bag out. We will terminate the battery B charge and terminate the jet monitor and I understand the way to do the jet monitor is I'll go to, I'll go to the SCS mode (garbled) 37 NOUN 20 and verify that the NOUN 26 is all zero's again, and I can go back to P20, is that correct?
CAPCOM Stand by one.
CAPCOM There's not requirement to go to SCS 16.
SC Okay, I can just call 37 20 without getting any firings?
PAO This is Apollo Control Houston. 91 hours 30 minutes. That's Ken Mattingly aboard Apollo 16 who has been speaking with CAPCOM Don Peterson here in Mission Control.
CAPCOM 16, just to be sure we're talking the same thing to kill the jet-on-monitor, we want to do a VERB 37 ENTER 30 ENTER, a VERB 37 ENTER 20 ENTER, and zero the NOUN 26.
SC Don, I can't get to the updates book where that written down, would you read it to me slowly and I'll do that terminate right now.
CAPCOM Okay, it's VERB 37 ENTER 30 ENTER, VERB 37 ENTER 20 ENTER, Zero the NOUN 26. And, 16, you about 1 minute to LOS, and you're looking good.
SC Okay, and we're taking an extra orange with potassium this morning.
CAPCOM Roger.
SC Houston, 16. Take a look at that BIOMED off of me and see how it looks, over.
CAPCOM Okay.

SC I got it reset, from yesterday.
CAPCOM Ken, still looks a little loose.
SC Well, it's not loose.
CAPCOM We'll have to take a better look at it next
time around, Ken.
SC Okay, this is John and the sensors are fixed.
CAPCOM We've got confusion down here on who we're
monitoring, John.
CAPCOM John, the lead we concerned with is the sternal
lead, the one on you breast bone. You might jiggle it a little bit.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/20/72 CST 7:30A GET 91:36 291/1

SC Okay, we're doing that. It sure looks
like it's all tight.

SC Okay.

CAPCOM John, you might try putting new sponges
on that lead.

SC Okay, I did that last night.

CAPCOM Okay, we'll pick you up next round and
talk about it.

PAO This is Apollo Control Houston at
91 hours 37 minutes into the mission. We've had loss of
signal with Apollo 16. The last conversation aboard the
spacecraft was John Young checking on his biomedical sensors.
We're at 91 hours 37 minutes into the mission and this is
Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control at 92 hours 15 minutes ground elapsed time and some 13 minutes 12 seconds until Apollo 16 reappears from behind the moon in its 10th lunar orbit. Gerry Griffin's gold team of flight controllers settled in for the day's activities leading up to powered descent and lunar landing. The offgoing shift of flight controllers have practically all left the room having debriefed their replacements. There will not be a change of shift briefing. Repeat will not be a change of shift briefing, inasmuch as the preceding shift was primarily a sleep shift. Apollo 16 still in a 59 by 10.6 nautical mile lunar orbit, current velocity - orbital velocity 5,355 feet per second, and current altitude at this point in the orbit 44.8 nautical miles. 11 minutes 57 seconds to Apollo 16 acquisition. At 92:16 this is Apollo Control.

END OF TAPE

PAO This is Apollo Control. 92 hours 27 minutes into the mission of Apollo 16. Less than a minute away from Apollo 16 reappearance around the eastern limb of the moon on lunar orbit number 10. On this next front side pass, the main concern of the crew will be transferring quite a few of the pieces of gear and equipment into the lunar module, getting the lunar module prepared for the descent and landing at the Descartes landing site. 6 minutes away, we may be a few moments late getting acquisition because of the apparent position of the high gain antenna as seen on the ground by the communications officer. Waiting for confirmation of acquisition of signal by the tracking network. Flight director Gerry Griffin is polling all of his flight controllers on the current status and preparation for the landing phase. Getting all of the details worked out. Any minor problems, the different positions, console positions, might have.

CAPCOM Standing by.

SC Hello, Jim.

CAPCOM Morning.

SC We're in the process of a little suit donning here and we've got one problem. I went to retrack the mass spectrometer and gammer ray boom came in fine but the mass spectrometer boom indicates barberpole and has stayed barberpole for 10 minutes. I went ahead and enabled the jetts and I'd like for you to take a look at the, at the telemetry talk back on the moon and see if you can suggest something for me to do.

CAPCOM Okay, we copy.

SC (Garble) - barberpole as a total barberpole.

CAPCOM We copy, Ken.

SC Okay.

CAPCOM 16, this is Houston. We're wondering if you've gone through the malfunction procedure of that boom retraction on page 1-24 on the systems handbook?

SC Well, I looked and didn't find one that was appropriate.

CAPCOM Okay, I guess you're right, Jim.

SC We're pretty busy as you know, Jim, so I'd really appreciate it if you could talk me through whatever steps you want.

CAPCOM Okay, understand.

CAPCOM 16, this is Houston. We'd like you to put the mass spect boom switch to the off position. That's if it's not there already.

SC Okay, I'll do that and when I do, it goes to (garbled).

CAPCOM Understand it goes to gray.

SC That's affirmative.

CAPCOM 16, this is Houston. We had understood that you had activated all your RCS jets. We show you're still in the SIM bay configuration.

SC Okay, thank you. I have switches with the
circuit breakers I've left out.

CAPCOM Roger.

CAPCOM 16, this is Houston. You can go normal
acquisition procedures on the S-band.

SC Okay.

SC Jim, what did you want me to do with that
high gain?

CAPCOM We wanted you to go through normal acquisition
procedures.

END OF TAPE

CAPCOM 16, will you go AUTO on the high gain?
 SC You have it.
 CAPCOM 6 - never mind.
 CAPCOM Okay, 16. This is Houston. We have
 SIM bay data now. Will you go back to retract on the boom
 switch?
 SC Okay. you have retract, Jim.
 CAPCOM Roger.
 CAPCOM 16, this is Houston. Will you check
 the talk back on that boom, and tell us whether it's full
 Barberpole or partial?
 SC It's the same as it's been, Jim. It's
 Barberpole full.
 CAPCOM Okay, we copy, a full Barberpole. We
 show it partially retracted with unacceptable limits.
 SC What do you mean partially retracted?
 Does that mean your telemetry point has cinched closer.
 CAPCOM That's affirmative.
 SC Okay, then I'll put it back into the
 OFF position -
 CAPCOM Stand by, Ken. I think we want it in
 retract.
 SC Okay, I'll leave it in retract.
 CAPCOM Okay, you could put the retract switch
 back to the OFF position.
 SC Okay, retract is OFF.
 CAPCOM Roger.
 SC You could watch that thing on telemetry -
 I could extend it enough to clear it and try and retract again.
 CAPCOM Okay, we're within limits, Ken. Let's
 hold what we have.
 SC Okay.
 SC Okay, Jim. On the docking latch number
 10, I've got some observations if you're ready.
 CAPCOM Roger. We're ready, Ken. Go ahead.
 SC Okay, when I look in under the LM
 umbilical connecter cover, the roller cam looks normal, and
 everything I can see from that side looks correct. When I
 look under the cover on the right side, the probe connector
 cover, I look at the (garble) in the little arm that sticks
 out from the bottom of the can when I compare it to another
 latch, it doesn't stick out as far, in fact the back of this
 part - this innerpiece of the bell (garble) has a part number on
 it and it's flush whereas on the other one it sticks out and
 shows the pin, so it looks like it hasn't come over center.
 Sorry I don't have the right part nomenclature.
 CAPCOM Roger, we copy.
 SC If you've got a docking latch on the table
 there somewhere, you can see what I've been looking at.

END OF TAPE

CAPCOM Ken, this is Houston. Can you see anything that might be abstracting or interfering with that CAM action?

SC No sir, I can't.

CAPCOM Okay.

CAPCOM 16, this is Houston. If you've got a P00 and EXCEPT we'll effect it. Okay just EXCEPT.

SC You're there.

CAPCOM Okay 16, this is Houston. You go back to flock.

CAPCOM 16, this is Houston. Do you copy?

SC Yes, he got it.

CAPCOM Roger.

SC Houston, we just passed over the good landing site and you can see the whole area. Pans out very nicely just like the model.

CAPCOM Very good, Ken. Thank you.

SC Houston. From my present position -- I can't be sure exactly where I am because I just looked out the window again, but we passed over a large crater and it has 3 little domes in the bottom of it with craters and the top of them look like very subtle cinder combs. So I'll try to mark that guy on the way back. It's one of the cluster of two large ones and several smaller ones.

CAPCOM Roger. We copy, Ken.

CAPCOM 16, this is Houston. Will you give us another reading on that docking tunnel index when you have an opportunity?

SC It is still the same thing, minus 3.5.

CAPCOM Roger. Minus 3.5.

SC Re-affirm.

CAPCOM 16, this is Houston. Will you film the ...

CAPCOM Go ahead, 16.

SC Okay. John and Charlie got their suits on and they are in the LM. Is there any reason they shouldn't go ahead and power up and get some cooling?

CAPCOM Standby.

CAPCOM Okay let's proceed, Ken.

SC Okay we'll proceed.

PAO This is Apollo Control. Apollo 16 commander, John Young and Lunar Module pilot, Charlie Duke are running almost 40 minutes ahead of the flight plan. And as much as they've already donned their pressure suits and they're in the Lunar Module, preparing to power it up. Flight plan calls for transfer --

SC (garble)

CAPCOM Roger.

APOLLO 16 MISSION COMMENTARY 4/20/72 CST 8:39 GET 92:45 295/2

CAPCOM And Ken this is Houston. The reason for that undervoltage last night was that the -- all the heaters just happened to come on at that particular time.

SC Thank you, Jim. We were (garble) relieve Don at the time.

CAPCOM I'll talk to you later.

SC Okay. Did you get my call on the LM power, 9307?

CAPCOM Sure did, 9307.

PAO This is Apollo Control. Some 25 minutes remaining now in this front side pass in the tenth lunar orbit of Apollo 16. Before the still docked Orion and Casper who are on the corner on the western limb of the Moon and 9309 still alive on the tenth lunar orbit. This is Apollo Control.

CAPCOM 16, this is Houston. S-band HAWKS, SCI switched to off, over.

SC That's all?

CAPCOM Roger.

END OF TAPE

SC Houston, can I give you some target angles, or did you copy them?

CAPCOM We have them, Ken.

SC Okay, and we're in the maneuver.

CAPCOM Roger.

PAO This is Apollo Control. The maneuver that was referred to just then by Ken Mattingly aboard the Command Module, Casper, was the maneuver to the undocking attitude which has a ROLL 0, PITCH 104, and YAW 0. Just about on time as called for in the flight plan, some 14 minutes and 8 seconds until loss of signal. This is Apollo Control at 93:20.

CAPCOM Ken, this is Houston, our plan on the mass spec boom is to leave it where it is, and we're going to ask John and Charlie to check it after undocking where it is requisitioned.

SC Okay.

CAPCOM And when I was trying to talk to you before, I just wanted to give you the words on that under-voltage which ya'll had last night. The reason for that was the fact that all the heaters came on at the same time. Over.

SC Okay, I guess maybe I jumped the gun, but it seemed to me like that master alarm came on instantly when I hit that switch and it seemed like the only prudent thing to do was to undo what I just did.

CAPCOM I'm glad to hear that tall thinking.

CAPCOM And, Ken, if you're - in a few minutes I can give you a flight plan update, a very short one.

SC Could you hold it. I'm in the middle of a P90 and canister change.

CAPCOM Okay.

PAO This is Apollo Control we have confirmation that the communications system aboard the Lunar Module is activated. We're beginning to get data out of the LM.

CAPCOM Ken, we have ARIA and select the S-band antenna.

SC Okay, Jim, you've got it.

CAPCOM Very good. We're reading you loud and clear.

SC And you're really beautiful too. We are on tape 3676. We'd have been a little bit further along but we had trouble with John's zipper today. Background noise - GARBLE.

CAPCOM GARBLE.

SC GARBLE. Background noise.

CAPCOM GARBLE.

END OF TAPE

SC How do you read, Jim?
CAPCOM Casper, this is Houston. How do you read?
PAO This is Apollo Control. 5 minutes away from
loss of signal as Apollo 16 passes behind the moon. Lunar module
cabin now showing at 5.02 pounds per square inch pressure. Suit
pressure 4.98 for both men. Cabin temperature 68° F.
CAPCOM Orion, this is Houston. How do you read?
ORION You're 5 by, Jim. How me?
CAPCOM Roger, we're reading you. We still have a
little noise but we don't the big dish out there.
ORION Okay, we got signal trace of about 39 on the
AFT OMNI.
CAPCOM We didn't understand 39 OMNI (garbled and heavy
background noise).
ORION (garbled)
ORION Noisy isn't it.
ORION (garbled)
ORION (garbled)
CAPCOM 16, this is Houston. You 2 minutes LOS.
sc Okay, thank you. We've got it.
SC Can you read me, Charlie?
SC Yea.
SC I don't read you.
SC You don't have your audio breaker in, do you.
SC Yea.
SC Did you turn on your stuff?
SC Yea.
SC How's that. How's that.
SC That's better. Okay, thank you. What was that?
How did you fix that.
SC I just put my microphone to my mouth.
SC Okay fine. Talk down for a little bit.
SC I've got my master volume up full.
SC Me too.
SC Okay, where are you at, Charlie?
PAO This is Apollo Control. We've had loss of
signal as Apollo 16, still docked at this time, passed behind the
moon during the end of the 10th lunar orbit. The crew of Apollo 16
considerably ahead of the time-line and getting the lunar module
manned and checked out. All three crewmen suited at this time.
Approximately 46, 47 minutes until acquisition. We'll come back
up at acquisition at the start of lunar orbit revolution number 11,
lunar orbit number 11, and at 93:35, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control. 94 hours 21 minutes into the flight of Apollo 16. Less than a minute away now from acquisition of data and voice from the spacecraft. Coming around now part way through the eleventh lunar revolution. The communications with the 2 spacecraft have been split at this time, that is a separate CapCom or spacecraft communicator. We'll be talking to Ken Mattingly aboard Casper. Ed Mitchell is the command module CapCom. Jim Irwin remains as CapCom to communicate with Ycung and Duke aboard Orion. During this eleventh revolution, we have acquisition of signal. Let's stand by for communications with Orion.

ORION Hello Houston. Old Orion, how do you read? Over.

CAPCOM Orion, this is Houston. Read you loud and clear.

ORION Okay, Jim. We're zipping right on through the checklist. We've got the PNGs up, the docked course aligned done, the landing gears deployed and the only thing we haven't done is really what you need to see. And we're ready to start in on the S-band checks and bring up the steerable. Over.

CAPCOM Okay Charlie.

ORION Okay, while guidance is - let me give you some angles. We had a VERB 06 NOUN 20 that was done and 9420 20. The LM angles were plus 29465 plus 28996 plus 35502. How do you read, Jim?

CAPCOM Roger, we copy you. Copy of the LM is plus 29465 plus 28996 plus 35502. Over.

ORION That's affirmative. The command module are plus 00269 plus 10931 plus 00472. Over.

CAPCOM Okay, copy. Plus 00269 plus 10931 plus 00470. Over.

ORION That's affirmative. It sounds like we've got good comm on primary stand PR and secondary power amp. I'm going secondary S-band PR and primary power S. Over.

CAPCOM Roger. We're standing by.

ORION Okay. (garble)

CAPCOM Casper, this is Houston. We want narrow on the S-band.

ORION Okay, Jim how do you read? Over.

CAPCOM Orion, this is Houston. Go ahead.

ORION How do you read, Jim. Over.

CAPCOM I read you, but there is a lot of noise and background.

ORION (garble) Okay, we have primary (garble) of activation time as 933330 and we're standing by for the AGS support constants. Over. Or let's do the steerables first

APOLLO 16 MISSION COMMENTARY 4/20/71 CST 10:15A GET 94:21 298/2

ORION and get you the downlink OP memory comp.
Over.

CAPCOM Okay, we're standing by for the steerables.
ORION (garble)

END OF TAPE

SC Loud and clear.
CAPCOM Roger, Casper. I have a PIPPA BIAS update for you.
CAPCOM Orion, this is Houston. We want you to go low bit rate and then bring up the high beam.
ORION Okay.
CAPCOM Orion, this is Houston. Pitch should be 99.
ORION Okay, Houston, we got the S-band OMNI. I can't - when I move the yaw drive the yaw indicator does not move on the steerable and I do not hear any grinding noise. Over.
CAPCOM Okay, copy. No response on the yaw drive.
ORION That's affirmative.
CAPCOM Whenever you're ready, Charlie, I'll read you the AGS abort process.
ORION Okay, go ahead.
CAPCOM Okay, 224 beginning plus 6 05 11 plus 294 19 plus 603 83 plus 00 565 minus 327 76 minus 544 12, over.
ORION Right. Copy starting with 224 605 11 294 19 603 83 00 565 327 76 544 12, over.
CAPCOM Okay. On 673 it was minus 544.
ORION Rog, that's what I got minus 544 12.
CAPCOM Good readback.
ORION Houston, Orion.
CAPCOM Go ahead, Orion.
ORION Okay, I can't seem to get the yaw out of the closed position minus 12 on the indicator, and I cannot hear it drive when I move this dial just like - and Ken's got the Gerry drive (garble) follows. Over.
CAPCOM We're reading you, Charlie. We want you to go through a little procedure here to essentially get you back to a start position. We want you to go to slew on the S-band. Check both S-band circuit breakers on 11 and 16. Select pitch at minus 75 and yaw of minus 12, wait 30 seconds and then go to an acquisition and we'll have some angles for you.

END OF TAPE

SC Okay, that's where we are.

CAPCOM Right, Casper, this is Houston, go to ACCEPT.
And Orion the angles for your S-band PITCH are 99 and YAW of 16.

ORION Copy, 99 and 16.

CAPCOM And Casper, this is Houston. I have a bias for you whenever you're ready to copy. Okay, on the (garble) it's PLSS 14 54, data 03521 PLSS 14 56, data 76274, over.

CAPCOM Okay, on the 14 56, couldn't hear you read back, Ken. The data is 76274. Sounded like a good read back. And Casper, this is Houston with a back load for you whenever you're ready.

ORION Houston, this is Orion. (Heavy background noise.)

CAPCOM Orion, this is Houston. (Garbled and heavy background noise).

ORION (Garbled)

ORION Going back up, how do you read?

CAPCOM Roger, we're reading, but still excessive noise down here.

ORION Okay, was it as noisy on the other transmitter receiver and power amp?

CAPCOM I think it's about the same, Charlie.

ORION Okay, be advised we went through the steerable set 2 on page 362, and the YAW still does not indicate that it's moving, and we cannot hear a grind. No, with those angles I get a, that I got of 99 is minus 12, I get a signal strength of greater than 3. I went track mode to auto and uplink, and when I went track to auto, it sounded like the thing is setting up there just constantly oscillating and the PITCH needle varies plus or minus 10. The sigma streak stays pretty constant. In fact, no matter what position I select on the S-band antenna, the sigma streaks stays up around 38 or so.

CAPCOM Roger, we copy.

ORION Okay, could we press on with the AFT OMNI and it's configuration, over.

CAPCOM Yea, let's press on.

ORION Okay, can you get an E-memory dump. We're ready for the E-memory dump.

CAPCOM Stand by one.4

END OF TAPE

CAPCOM Okay let's bypass that cause we need high
bit rate.
SC Okay you can't get a HIGH bit rate on
the OMNI?
CAPCOM Not until we can get through the (garble).
SC Okay. You will bypass the uplink? And
we'll go on and do the -- the acid battery checkout.
CAPCOM (garble)
SC Okay is it okay to the P52 without the --
Okay, to do the P52 as soon as we get into darkness here?
SC Houston, can we do the P52 when we get
into the darkness, over?
CAPCOM Standby. Okay we're preparing a REFSMMAT
for you now John, but you'll have to put it in manually. Then
you'll be able to proceed.
SC Roger. (garble).
SC Can't use that.
SC Here's the P27 PAD.
SC Where's the G&C check list?
SC (garble)
CAPCOM Okay Orion, this is Houston. I have
P27 for you, one for REFSMMAT and the others are state vector.
SC Okay, go ahead.
CAPCOM Standby one. Orion we would like you to
go back to slew and place the antenna for slew position.
Minus 75 and minus 12. Just leave it there.
SC Tell them okay we've got it. -- Okay we
got it.
CAPCOM Charlie when you're ready to copy, I have
this P27 update for the REFSMMAT and state vector record.
SC I'm ready to copy.
CAPCOM Okay, index is 24, 017, 31, 125, 60, 22624,
66315, 75546, 71001, 47526, 02044, 04020, 70164, 73753, 15651,
30651, 64233, 64471, 65647, 63433, 74021, 76063, over.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/20/72 10:30 CST 94:44GET 302/1

ORION Okay, readback index 24, index is 24 01731
12560 22624 66315 75546 71001 47526 02044 04020 70164 73753
15651 30651 64233 64471 65647 63433 74021 76063.

CAPCOM Okay, that's a good readback. I have your
state vector for you when you're ready.

ORION Roger, go.

CAPCOM Okay, if you're ready, Charlie, on the
state vector. Index 21 015 01 7775 77776 576 02 00 301 374
50 001 55 206 21 201 11 314 50 00 662 172 60 76 004 552 26
04076 171 20. Over.

CASPER Okay, state vector. 21 index 015 01 77775
77776 576 02 00 301 374 50 001 55 206 21 201 11 314 50 00 662
172 60 76 004 552 26 04 176 171 20.

CAPCOM Right on item 20 it's item 040 76, over.

CASPER That's what you've got.

SC That's what I have 040 76.

CAPCOM Roger.

CAPCOM Orion, this is Houston. I have a setback
whenever you are all ready.

CASPER Okay, what do you want?

CAPCOM Orion, this is Houston with another procedure
for the S-band.

ORION Roger.

CAPCOM Roger. We want you to open the S-band
antenna circuit breaker on panel 11, wait 1 minute and then
try acquisition again.

ORION Roger. It worked.

CAPCOM After 1 minute you can close the circuit
breaker and try an acquisition.

ORION Rog.

END OF TAPE

SC (Garbled) As for state vector, okay.
 SC We'll get VERB 74.
 SC VERB 71.
 SC VERB 71. Enter.
 SC Enter. 24 enter.
 SC 24 enter.
 SC It doesn't say that.
 SC Okay, Houston. How do you, you load this
 state vector by a VERB 71, and then a 24 enter, then enter the
 numbers, right?
 SC No, that's the REFSMMAT.
 CAPCOM Stand by.
 SC State vector's the 240 cut. See, we've got
 a flash on 24.
 SC I guess you do a 24, you're going to get it.
 The VERB 71 and then you've got 24 index. Now, starting with 1174,
 okay?
 CAPCOM Orion, this is Houston. Roger, you should
 enter existence as dead up on the PAD.
 SC Understand, VERB 71 then a 24 enter, then a
 01731 enter, and so on.
 CAPCOM That should be correct.
 SC Okay.
 SC 01731 enter.
 SC Okay.
 SC 12560 enter.
 SC Enter.
 SC 22624 enter.
 SC Enter.
 SC 66315 enter.
 SC Enter.
 SC 75546 enter. No, 755 -
 SC 755 -
 SC 46 enter.
 SC 46 enter.
 SC 71001 enter.
 SC Enter.
 SC 47526 enter.
 SC Okay, enter.
 SC 02044 enter.
 SC Enter.
 SC 04020 enter.
 SC 04020.
 SC Yea.
 SC Okay.
 SC 70161 enter. Wait a minute. Have to take
 that back.
 SC We're not allowed to do that.
 .

SC Okay, we'll go back and change that later.
Throw it out. 73753 enter.
SC 73 -
CAPCOM Orion, this is Houston.
SC 7 -
CAPCOM A reminder of a VERB 33 at the end of your
entries.
SC Rog. Understand. We've got a hot mike over
here. Go ahead. What are you on, 1207.
SC Okay, (garble) okay, 15651 enter.
SC 51 enter.
SC 30651 enter.
SC Enter.
SC 64233 enter.
SC Enter.
SC 64471 enter.
SC Go.
SC 65647 enter. 63433 enter.
SC Enter.
SC 74021 enter. 76063 enter.
SC 6 what?
SC 6063 enter.
SC Go.
SC Yea, a mistake on 70 - okay, let me see that.
SC It says delete. We got to check it.
CAPCOM Okay, Orion, this is Houston. We're looking
at page 1-26 in the G&N dictionary to review the data.
SC Roger, so are we. Okay, and we've got one
that's wrong.
SC Yea.
CAPCOM Yea, we heard that, and we believe that it's
number 13.
SC VERB, oh, let's see, it's number 13. We concur
Jim.
SC Enter.
SC Enter.
SC Okay. Fire one data. NOUN 15.
SC Enter.
SC Enter.
SC Enter.
SC Enter.
SC Enter.
SC (Garbled and heavy background noise.)
SC Enter.
SC NOUN 15. NOUN 15 and enter. There we go.
Okay. Okay, let's review it.
SC Okay, 0731.
SC Yea.

SC Go ahead.
SC Oh darn. You've got to enter every one of
those. VERB 1 NOUN 1 enter. 117 pre-enter. NOUN 15 enter.
SC Enter.
SC Okay. Now enter for each one, okay, now that
one's correct. Now enter again. Okay, 12560. Okay, 22624, 66315
75546, 71001, 47 enter. 47526.
SC Go.
SC 62044.
SC Just a moment. That isn't what it says.
02044. Okay, mark that one. It's wrong.
SC Okay, let's change it right now.

END OF TAPE

ORION Change data load component identifier -
correct data E. Okay, okay.
CAPCOM Okay, Orion, this is Houston. Line 11 should
be 02 044, over.
ORION Okay, feels good.
ORION 4020.
ORION Yeah, that's what's wrong.
ORION Okay, fix it.
ORION Okay. Unit component identifier 13. 13 and
I think it's NOUN - Hey, Jim, on the checklist when it says
load component identifier, we got -- 13 is wrong -- what do we
load in there?
CAPCOM A 13 ENTER.
ORION Okay. 13 ENTER. Okay, load 70 70 0164
ENTER and the next one is 15 -
ORION I don't think it took.
ORION Skip one.
ORION Hey, why don't you do the RCS pressurization
and I'll do the (garble).
CAPCOM Orion, this is Houston, we'd like you to close
that circuit breaker and try an acquisition on the steerable.
ORION Okay, it worked.
ORION Hey, Jim, the yaw is still not working.
CAPCOM Understand yaw is still not working.
ORION It's affirmative.
ORION You doing it over? All right, good idea.
(garble)
ORION Sure.
ORION Okay, lodging feet has got me go.
ORION (garble)
ORION I'll get it.

END OF TAPE

SC Okay Houston. We're pressurizing RCS now.
CAPCOM Roger. I understand you're pressurizing
RCS?
CAPCOM Okay, Orion, your RCS press looks good.
SC (garble) through the P52, Ken.
CAPCOM Roger.
SC Okay it's in. (garble).
SC (garble) got translation report yet. Okay.
(garble) off. (garble).
SC Okay Houston we're ready for the RCS
checkout. I guess we still don't have HIGH bit rate.
SC Houston, over.
SC Houston this is Orion, over.
CAPCOM Orion, this is Houston -- (garble)
SC Houston.
SC This is Orion, over.
CAPCOM Go ahead, Orion.
SC (garble) they are over.
SC No.
SC Do you want us to open the SSP's. No don't
do that. (garble).
CAPCOM Standby, Charlie.
SC Excuse me. (garble)
SC (garble) that was what he said, wasn't it.
SC That ain't right.
SC We're going to puff all the RCS into the aft
tank. It looks like to me.
SC Well I just closed it again.
SC Good.
CAPCOM Okay Orion, the RCS pressure is creaping
up on system A.
SC Okay it looks all right here (garble).
SC Go ahead, Casper.
SC Roger. We're not going there yet. I'll
tell you when.
CAPCOM Orion, this is Houston. Do you read that
system A manifold pressure?
SC Roger. System A manifold pressure is
195.
CAPCOM Copy 195.
SC 190. Make it 190.
CAPCOM Roger, 190.
SC Thanks, Charlie, you're a genius.

END OF TAPE

ORION (garble)
 ORION Did you?
 ORION Okay. We got it.
 ORION Want me to check the other one too?
 ORION Yes.
 ORION Houston, it looks like parts of the manifold
 pressure -- I hear you're speaking up again, that's why we're
 holding it.
 SC Okay, we -- it does look like it drift
 5 pounds.
 ORION We do a P52.
 CAPCOM Okay, Ken, stay at mid deadband. We'll
 do a P52 here.
 ORION (garble) grand slope.
 ORION Okay?
 ORION Yes. What do you need, Charlie?
 ORION Let me know when we're 37 up on the
 last antenna.
 ORION (garble) VERB 32, slowed 335 (garble).
 ORION P52 -- can it be P53.
 ORION (garble) Houston, we want (garble) AS
 and (garble) open and under no situation do we want the
 (garble) pressure to exceed 180.
 CAPCOM Okay.
 CAPCOM Okay, we closed it. It's (garble) expression
 is 170 now.
 ORION We copy.
 CAPCOM And RTS in 180 and we're down to 85
 percent.
 ORION We get what, Charlie?
 ORION P52.
 ORION (garble)
 ORION (garble) or wherever it is.
 ORION 80 on the first turn.
 ORION Okay, we can't do a P52, we have to do a P53.
 It would be --
 ORION (garble)
 ORION No.
 ORION How do you know?
 ORION I'm looking at DOD.
 CAPCOM Orion, let's do that state vector in before
 you do the P52.
 ORION It's all in, Jim.
 ORION Okay.
 CAPCOM We understand you already have it done.
 ORION 32 enter.

ORION 32 enter.
ORION There you go.
ORION Got it?
ORION We go over to the next display, right?
ORION (garble)
ORION (garble) let's do again (garble).
ORION 373 enter.
ORION 32533 enter.
ORION (garble)
ORION 353.
ORION Okay.
CAPCOM 331.
ORION 331.
CAPCOM Yes.
ORION You got it?
ORION We got to check the light control, Charlie.
ORION Yes.
ORION (garble)
ORION There you go.
ORION (garble)
ORION Yeah.
ORION (garble)
ORION 33195.
ORION Again.
ORION 33197.
ORION Again.
ORION 33 -- let me check that again.
CAPCOM Okay.
ORION Let me check.
CAPCOM You got it in, I'm sure of it, Charlie.
ORION 33195.
ORION Commence 33180.
ORION 8?
ORION 33180.
ORION (garble)

END OF TAPE

ORION It returned.
ORION Okay. Mark. 16950. 170 07 and 170 78
10. GARBLE. 165 90 16990. Mark 21 enter.
ORION Why don't you let GARBLE.
ORION Heavy background noise - GARBLED.
CAPCOM Orion, this is Houston. Will you check
the (garble) radar operating (garble)
ORION They're open. Do want the number on the
35.
CAPCOM We copied that. We know they're open.
SC (garble)
CAPCOM Okay, the rendezvous radar operator should
be closed at this time.
ORION Okay. No good.
CAPCOM Okay. We're closed and stand by (garble).
ORION Okay, the rendezvous radar operating
(garble) is closed.
CAPCOM (garble)
ORION Okay.
ORION (garble)
ORION Hey, Jim. We got the rendezvous radar
(garble) can we move it out of the way or can we place it
on a star.
CAPCOM Stand by.
CAPCOM Go ahead and move it back.
ORION Okay. (garble)
ORION We're still doing a P52. We'll get to
you in a minute.

END OF TAPE

SC (garble).
CAPCOM Okay, Orion, this is Houston. On the STS problem. We want you to transfer out System A down to 80 percent. (garble) transfer out (garble). We want you to go ahead and transfer now, but (garble) the pressure buildup 180, over.
SC We copy.
SC Okay (garble) 80 percent and (garble) pressure (garble) 155.
SC Okay Charlie. (garble)
SC (garble) plus 260, 118. 260 plus 12.
Plus 26118.
SC Plus 26117 (garble).
SC Okay.
SC (garble) 30.
SC 160 17. Wait a minute. 6057 (garble).
16010 (garble). 16092 (garble) 16182. (garble).
SC Okay.
SC Houston (garble) 93 --
CAPCOM Orion, Houston (garble). We're going to do that (garble) check on the back side. We'd like you to use that System A (garble) with that is to close a SOB on System B and to open the (garble) --
SC (garble).
CAPCOM approximately (garble) you'll just be using System A.
SC Say that again, Jim.
CAPCOM Roger. For your (garble) check on the back side, we want you to use system A. So we'd like you to close the main SOB, System B and open the cross field.
SC All right we copy.

END OF TAPE

ORION Roger, we copy. (garble)
ORION Okay, Ken. We no longer need S-band.
We'd like an 06 noun 20.
CASPER Roger. 5 4 3 2 1 Mark.
ORION I know why that was, when we started
the park we're in that hold, see.
ORION And it parked just to go there.
ORION That's right. Okay read those numbers
for me.
ORION 4933 -
CAPCOM Orion, this is Houston.
ORION 289 225. Go ahead.
CAPCOM Roger 491. As soon as you get the P52 com-
pleted, you have the dope for undocking.
ORION Okay, we've already completed it.
ORION Okay, Jim. On the torquing angles, we
didn't copy but they were less than 1/2 a degree and our
noun 6's are 9523 and 24 for command module plus 268 plus
10919 plus 005 00503 noun 29338 enter gimbal 28925 35491
and the torque was about a minute before that on the P52.
ORION Okay, and we're ready to go to RCS
checkout?
ORION Okay, guidance control P
ORION A.
ORION Okay, guidance control 4 jet
ORION 4 jet.
ORION Antenna control (garble)
CAPCOM Okay, Orion, we copy that.
ORION Remote control both bands in hold.
ORION Remote control in hold
ORION Remote control in hold.
ORION CHS in 4 disable. (garble)
ORION Ken, we need wide deadband and enable
hold.
ORION We need wide deadband and enable hold.
ORION Wide deadband attitude hold.
CASPER (garble)
ORION Okay, we're going to RCS checkout, Ken
verb 76.
CASPER Go.
CAPCOM Roger, we copy.
ORION Okay, verb 11 now Ken, ENTER, 5 ENTER
Okay, command TCA, UP (garble) Okay, that's okay, we're
not on the firing line. NOUN 25
ORION Good. Okay, let me (garble)
CASPER It's all yours Charlie. Good. Good.
CAPCOM (garble) from LOS.
ORION Go right, right Jim? Left. Good one.
Up forward. Good one. Good. Good. Okay, let me turn the
page. Command go 11 attitude direct closed.

CASPER Attitude direct CLOSED.
ORION Verb 77.
CASPER Verb 77.
ORION Verb 15 noun 01 ENTER.
CASPER Roger. Noun 01 ENTER.
ORION 42 ENTER.
CASPER 42 ENTER.
ORION Okay, noun control right. (garble) okay,
left go right, no you don't go back, go left. good number pick
up. Good number (garble) That's a good number. Go right.
Good number. Go left. Good number. Pick it up again. Good
number. (garble)

END OF TAPE

PAO This is Apollo Control. We've had loss of signal toward the end of the 11th lunar revolution of Apollo 16 still docked at this time, however by the time that the two spacecraft come around the front side of the moon again at the start of the 12th revolution they will have undocked. I have a schedule of ground elapsed time of 96:13, about 4 minutes, correction 6 minutes prior to first acquisition on orbit number 12 as the spacecraft went around the corner. Duke and Young were conducting the reaction control system hotfire checks aboard lunar module Orion. There has been some difficulty in getting the steerable S-band antenna on Orion to perform particularly to yaw to the proper settings for providing good communications to earth. However, for revolution 13 which is the landing revolution we will have the 202 foot, 210 foot large communications dish at Goldstone, California in acquisition of the spacecraft and all the high bit rate data, voice and all of the forms of communication with Orion can be handled through the OMNI antennas, provided we do have the 210 foot antenna. There was some imbalance between reaction control system regulator pressures between systems A and B that was the reason why the crew was instructed to open the cross beat to allow some of the propellant from system A to go into the ascent propellant storage tanks. The propellant is not lost in this operation. It merely is transferred to another tank. Also the crew is instructed to use system A only for the RCS hotfire, also to take some of the load off of the RCS system A. We're some 45 minutes away from acquisition in revolution number 12 at LOS Apollo 16 at an orbit measuring 10.3 by 58.9 nautical miles and at 95:32 ground elapsed time, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control at 95 hours, 45 minutes ground elapsed time. Some 31 minutes away from acquisition of Apollo 16 as it starts around the front side of the moon on orbit number 12. To summarize the apparent problem with the lunar module steerable antenna, if by the time of power descent and landing the problem has not sorted itself out and the antenna is, indeed, out of commission, right now, it appears that the crew cannot get the antenna to rotate in the yaw movement. It will be possible for all data invoice, high bit rate data, to be relate to earth through the OMNI antennas starting with revolution number 13 which is the landing revolution. The 210 foot antenna in Goldstone, California will be the prime site. There's no apparent concern here in Mission Control with the potential loss of the steerable antenna. Some mention as been made of the fact that the meters that indicate antenna position sometimes fail or hang in the one indication, when actually, the antenna is properly rotating, but over the next two revolutions, this situation should sort itself out. At any rate, loss of the antenna does not mean that the landing will be aborted. We're still in a go situation. And at next acquisition, the two spacecraft, Casper and Orion, will have been separated by some 6 minutes prior to acquisition. 28 minutes now until acquisition of signal from Casper and Orion. At 95:48, this Apollo Control.

END OF TAPE

PAO This is Apollo Control. 96 hours 15 minutes. About 50 seconds now away from acquisition of signal with Orion and Casper coming around from the backside of the moon. Separately this time. Standing by for confirmation from the network controller that the tracking station does have data and down length from the two spacecrafts. There will be some trouble shooting around this REV on the steerable antenna on Orion, and a further check out of the discrepancy in regulator pressures on the lunar module re-action control system thrusters. We have AOS confirmation from network controller. Let's come up on the air-ground circuit to monitor the first words.

CAPCOM Orion, this is Houston. How do you read.

ORION Roger. 5 - 5 Jim, and we're sailing free.

CAPCOM Roger.

ORION Okay, Jim, it was little rushed but we got it done. The only thing bad is I got a pack full of orange juice.

CAPCOM Okay, we copy, and we'd like for you to go through another procedure here to get the S-band locked up with your rate. Would you like to take a few notes.

ORION I understand. Stand by one.

ORION Stand by one, Jim.

ORION Okay, we're on one mike still, John.

ORION He told us to go ahead.

ORION Okay, Jim, go ahead.

CAPCOM Roger, we wanted you to put the steerable at PITCH minus 75 and YAW minus 12. In other words, the stowed position. We'll track mode slew, wait 30 seconds, and then go PITCH of plus 63 YAW of minus 32 and antenna S-band slew. Proceed with normal acquisition. Over.

ORION Okay, we copy.

CAPCOM And Orion, this is Houston, we're -

ORION Hey, Ken.

CASPER (garbled)

ORION Okay, look up over, our right side and look at that antenna, the steerable and see if how it's moving. I'm going to move it in PITCH then in YAW, over.

CAPCOM And Orion, this is Houston. We'd like to -

ORION (garbled)

CAPCOM - find out what you RCS configuration is at this time.

ORION Okay, Jim, we have -

ORION System A and B are open, cross C is closed, and that's it. (garbled) are terminated.

CAPCOM Roger, we'd like for you to use system A just as long a possible.

ORION Okay, system A is, system A is now open, cross D is open and system B is closed.

CAPCOM And Orion, have you loaded the AGS aboard
COM just yet?
ORION Negative.
ORION That's negative, over.
CAPCOM Okay, understand negative.
ORION We don't have the AGS up yet, Jim.
CAPCOM Roger, because when you do load those (garble)
we want you to load nominal values. Data first.
ORION Okay.
ORION (Garbled and heavy background noise) controls
nominal. Okay, we're going ahead with the (garbled) check, Jim.
CAPCOM Okay, and if the PLSS S-band procedure doesn't
work for us we're going to ask you to maneuver. Connect the AI
attitude, where the YAW angle does not have to change (garbled).

END OF TAPE

SC Roger. I understand.
SC (garble) Charlie.
SC Okay Houston (garble)
SC Okay Houston back on the (garble) how
do you read?
SC Houston (garble) how do you read?
CAPCOM Orion this is Houston. We'd like you
to proceed now with this attitude maneuver. I'll give you
MBI angles (garble).
SC Go ahead.
CAPCOM Okay the MBI is ROLL 000, PITCH 053,
YAW 000, the steerable angles PITCH plus 26, YAW minus 12,
over.
SC Copy. 000, 053, 000, PITCH 26 YAW
minus 12.
SC Okay, Houston, we're (garble) check. It's
12, 51, (garble). 51 and 100.
SC (garble).
CAPCOM Roger. (garble) looks good.
SC (garble) for you. Are you ready to copy?
CAPCOM (garble) NOUN 20's.
SC Okay. With Lunar Module, Orion.
Orion we've got 29603 plus 28563, plus 35951. For the
Command Module, Casper plus 00004, --
CAPCOM (garble).
SC (garble) 556.
SC Okay Jim, how do you read now?
CAPCOM Well there's real excessive noise down
here. Give me the Command Module numbers again.
SC Okay how do you read now. (garble).
CAPCOM I can just barely read you, Charlie.
SC Okay (garble) Command Module. (garble)
10556, 100045 (garble) 02, 20, over.

END OF TAPE

ORION (garble)
CAPCOM Orion, this is Houston. We (garble)
latitude. We'd like you to go to (garble) position.
ORION Okay, we're in latitude and we go to
(garble).
ORION (garble)
ORION (garble) over.
CAPCOM Charlie, I just barely read you.
ORION (garble) primary transmitter receiving.
CAPCOM Casper, Houston, do you read me?
CASPER Loud and clear.
CAPCOM We just barely hear you but I have a
TGA for you (garble).
CASPER Roger, can we now do the DPS pressurization
checkout, over?
CAPCOM Roger, we're ready for DPS press.
CASPER Okay. We'll go ahead with the TGA now.
CAPCOM (garble) Heavy background.
CASPER (garble)
CAPCOM (garble)
CASPER (garble) DPS pressurization.
CAPCOM (garble)
CASPER (garble). DPS pressurized from 1.5 to
(garble) .5.
CAPCOM I'll tell you one thing, Charlie, (garble).
ORION (garble)

END OF TAPE

SC GARBLE.
 SC Heavy background noise. 46
 SC Roger. Landing radar check out.
 ORION There we go, go to landing.
 ORION Radar set for landing power signal light
 out.
 ORION Okay, Jim, Houston on the steerable, I mean
 listen at me - Orion on the steerable, how do you read, over.
 CAPCOM Man, we read you much better.
 ORION Okay, it worked that time Jim, we got a
 4.2 signal strain and the steerable is working on the track
 mode auto.
 CAPCOM Very good. I have some words for you on
 the RCS.
 ORION Okay, go ahead.
 CAPCOM Okay, let's go normal configuration on your
 RCS and then we want you to transfer 3 percent more out of
 system A as we see the pressure going up on A.
 ORION Okay, transferring -
 CAPCOM And the caution of course not more than
 180 on the amps.
 ORION Okay, the landing radar H dot is only
 reading minus 17 right now. The 8,000 works okay.
 CAPCOM Orion will you give us high bit rate, please.
 ORION Okay, that looks good. You've got high bit
 rate biomed at left.
 CAPCOM Roger.
 ORION Jim, can we try a pitch maneuver back to
 the landing site viewing attitude so we'll see if this thing
 tracks?
 CAPCOM Stand by one.
 CAPCOM Okay, just hold it one, we want to get our
 uplinks in and then you can try that maneuver.
 ORION Okay.
 CAPCOM Okay, Orion let's go P00 and data and we'll
 send you an uplink.
 ORION Okay, you've got P00 and data.
 CAPCOM Roger.
 ORION Okay, Houston the landing radar jets is not
 working properly.
 CAPCOM Okay, what's the problem, Jim.
 ORION Well, it's not reading the right numbers in
 altitude rate and it's not reading the right numbers in VERB 63.
 The altitude transmitter is 3.2, the velocity transmitter -
 velocity transmitter is 3.7.
 ORION And, Jim, the AGS is loaded with the data
 card - go ahead.
 CAPCOM I'm sorry. Okay, we want you to select
 normal voice.

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ORION
over.

AGS is loaded with the data card numbers,

CAPCOM

Roger, I copied Charlie.

END OF TAPE.

CAPCOM Orion this is Houston. Are you also showing bad data on the tape meter on the landing radar?
ORION That's affirmative.
CAPCOM Roger.
ORION The 8 -- altitude is reading right at 8000, but the BLOZY was only reading 15. I'll run it again.
CAPCOM Roger.
ORION Can I run it while B27 is in progress?
CAPCOM Standby on that one.
ORION Yes, I'm sure I can.
CAPCOM Hold off on that landing radar check until after the uplink.
ORION Okay. We'll go off and pull the circuit breaker.
ORION Jim, we'd like to start a PITCH back down so we could see the landing site.
CAPCOM Standby. We're still getting the uplink.
CAPCOM Orion, this is Houston. I have the abort paths whenever you are all ready.
ORION Okay standby. Okay, go ahead.
CAPCOM Okay, at the beginning no PDI plus 12. 098, 47, all zeros, plus 01, 023, plus all zeros, minus 00500, 01380 plus 00110, 01139, 035, all zeros, 273, 59270 plus 01026, plus all zeros, minus 00494, 09935, all zeros, 10122, 1500. Throttle profile 10 percent for 26 seconds full throttle for remainder LM weight 36673, over.
ORION Okay, Jim. That was a little bit too fast, but I think I got it all. 098470000 plus 01023 plus all BALLS minus 00500, 01380 plus 00110, 01139, 035 all BALLS, 273, 59, 270, 012, 760 plus all BALLS minus 00494, 09935 all BALLS, 10122, 1500, LM -- that's throttle profile at 10 per cent for 26 seconds at full throttle LM weight 26673, go ahead.
CAPCOM Roger. It's a good readback. Let me just confirm that NOUN 86 DELTA VX is plus 01026 and we're finished with your computer. Okay and we need (garble) VERB 74. (garble) radar check again (garble).
CAPCOM You have it.
ORION Okay, read that again, Jim. The DELTA VX.
CAPCOM DELTA VX NOUN 86 is plus 01026. And Charlie, I'm ready on the PDI path.
ORION Okay, I was wrong on that. I got it now 01026.
CAPCOM Okay are you ready PDI?
ORION Go ahead with the PDI path.
CAPCOM Okay India 0 --
ORION Repeat.
CAPCOM 09835, 0468, 11004 plus 00026, 002, 114, 340, plus 56997, PDI EARLY JULIET 101, 221500, HELOW 103,

CAPCOM 21 all zeros, over.
ORION Roger Jim. Could we start a PITCH attitude
now and see the landing site?
ORION Are you done with our E-MOD, Jim?
CAPCOM We're finished with the E-MOD dump, but
we'd just as soon get all these paths up and we're not con-
cerned about the landing site down here.
ORION Okay --
ORION I didn't think you were.
ORION Okay fine. I'm down through kilo and
I'll read back starting with India. 098350468, 1104 plus
00026, 002114, 340 plus 56997, 10122, 1500, 103210000, over.
CAPCOM Okay that's a good readback and I have
T2 and T3 for you.

END OF TAPE

ORION Go ahead.

CAPCOM Okay. T2 Lima 098 59 2903 105 19 45 00, T2
 at TDI plus 24 plus 25, and T3 Victor 100 42 4286, over.

CAPCOM Orion, will you verify auto on the steerable.

ORION It is in auto.

CAPCOM Roger.

ORION Okay, in reading back starting with Lima,
 098 59 29 03 105 19 45 00, November 100 42 4286, go ahead with
 the next one, over.

CAPCOM Okay, we're standing by for the landing radar
 checkout, John, and of course Charlie, he got that T2 at TDI at
 24 plus 25 and I have an AGS K factor for you.

ORION Okay, go ahead with the AGS.

CAPCOM Okay. 00090, all zero's, 00111, over.

ORION Okay, copy. 9 - 900000111.

CAPCOM Good read back.

ORION Okay, there's the data. It's reading
 all right in H dot, but it's changing data in the, in the
 next 2 registers.

CAPCOM Roger, we're looking at it down here.

ORION And the tape meters, and the tape meters now
 reading 48 opening, and the altitude meter would, the first time
 I did it, it read 8 thousand, and now it's reading Zero.

CAPCOM Okay Orion, let's go LOW BIT rate, and we're
 losing the steerable.

ORION Roger. Jim, I don't think it's tracking in
 YAW.

CAPCOM Orion, we'll get back to you on the landing
 radar.

ORION Roger.

CAPCOM And Orion -

ORION You can see the data.

CAPCOM Houston, just a reminder on the load 405 and
 406 to plus Zero.

ORION Rog.

CAPCOM And we're ready for HIGH BIT rate.

ORION Okay, do you have it?

CAPCOM Roger.

ORION Okay, I'm going to terminate the landing radar
 test if that's okay with you all.

CAPCOM Roger.

ORION That's negative, Houston wants them to stay
 locked on right now.

CAPCOM Orion, this is Houston. I have a circuit PAD
 if your ready to copy.

ORION Stand by. Go ahead.

CAPCOM Okay, ignition at 097 40 1716 NOUN 81 plus
 00681 minus all Zero's minus 00580, over.

ORION Right, copy. 097401716 plus 00681 minus all
 ball's minus 00580.

CAPCOM Good read back.
ORION Okay, we'll go ahead and go, do the IMU
(garble) right now if that's okay with you, Houston.
CAPCOM Roger, we're standing by, John.
CAPCOM Okay, Charlie, will you. in 404 will you put
minus 12345.
ORION Roger.
ORION Okay, Houston, when we do this attitude maneuver
for this P52, we're going to lose HIGH GAIN.
CAPCOM Stand by.
ORION Is that all right?
CAPCOM I think we're all prepared for it.
ORION Okay.

END OF TAPE

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CAPCOM Okay, you can go ahead and maneuver,
John, and we want you to use the RCS system A.
CASPER Okay. We're using system A.
CASPER Okay, Houston, we have you on the
(garble).
CAPCOM Orion, this is Houston, go low bit rate.
ORION We have it.

END OF TAPE

ORION (garble) 01 to (garble).
CAPCOM Orion, we cannot read you. Will you
go down to us and back up.
CAPCOM Orion, (garble).
ORION (garble) copy.
CAPCOM Okay, perhaps we can read the torquing
angles if you want to give them again.
ORION The angle difference is minus 905.
CAPCOM Okay, we copied your 905 but we did not
get the torquing angles. I hope you all have written it
down.
CAPCOM Orion, this is Houston. We'd like to
get high bid rate again and some good voice. We'd like you
to go back to that attitude which we gave you of pressure
20553 and set in the steerable angles pitch plus 26 of yaw
minus 12.
ORION Okay, we're in route.
CAPCOM Just delay the landing radar test until
we get some good data.
ORION Okay.
ORION I guess on that land radar, with the
circuit breaker in, Charlie is working off the ground --
maybe not.
CAPCOM Go forward OMNI Orion.

END OF TAPE

ORION Okay, Ron let's go back to low bit rate until we get the steerable.

ORION Okay, Jim, we have you now on the steerable, how do you read. Over.

CAPCOM I read you loud and clear. You sound beautiful.

ORION Okay, the P52 went super. Our torquing angles were minus .060 plus .139 minus .018. We torqued at 96:58:40 over.

CAPCOM Roger, copied. On torquing angles minus 060 plus .139 and minus 0 .018 at 96:58:40.

ORION That's rog.

CAPCOM And you go normal voice.

ORION And the AGS checkout has gone well.

CAPCOM Okay.

ORION The only thing we haven't done is rendezvous radar checkout and we'll get to that soon as Ken gets through with his burn.

CAPCOM Roger, we're recommending that rendezvous radar check out on the backside and landing radar checkout is the one I want to go through now.

ORION All right, fine.

ORION Okay, we're going now. Okay it's up in left like it's supposed to be.

CAPCOM Okay, John, when you get to the NOUN 66 - 67 values we want you to read us the tape meter values of H and H stuff.

ORION Okay, it's right on, Houston. It's 8,040 off the H dot.

CAPCOM Roger, we copy.

ORION Okay, minus 495 plus 1860 plus 1331 right on and the tape reader is up in left and it reads 8,480. I think it was locked on the ground or something when we came over that low pass due to our communications angle. I may be wrong, but that's - it was sure acting funny.

CAPCOM Okay, it's looking good to us now.

ORION Okay, we've got 3 zero nouns, 2 transmitter and 345 on the velocity transmitter, make that 355.

CAPCOM Okay, we copy.

ORION Hey, Jim on those drink bags I tell you it's pretty hard to see things when you've got a helmet full of orange juice and zero gravity is something with that orange juice.

CAPCOM Well, you've got to drink fast.

ORION You really do.

ORION When do we get the 210 (GARBLE).

CAPCOM Okay, acquisition on your next (GARBLE).

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ORION Hey, Jim we had to turn on our window heaters for about 10 minutes per side to clear up the windows right before undocking.

CAPCOM Roger, we copy.

ORION We've been using the - we've been using the LCG pump to keep cool in here and it's really neat.

CAPCOM We copy.

ORION We've been needing something to keep cool I'll tell you.

CAPCOM We understand completely.

END OF TAPE

ORION Jim, your uplink voice is just beautiful in every antenna we got. Over.

CAPCOM Okay, that's a good data point. Unfortunately, the downlink is very very noisy.

ORION Okay, I wonder what happened. On the check - the comm checks we did at 55 hours, of course it was closer, but it was real good then, I thought.

CAPCOM Okay, we understand. It's just a completely different situation, Charlie.

ORION Okay.

CAPCOM But your voice is just crystal clear right now.

ORION Roger.

CAPCOM Orion, this is Houston, with some trajectory information for you.

ORION Go ahead.

CAPCOM Roger. It looks like you'll be coming in about 10 000 feet high at PDI, John, which will be about 3 to 4 seconds of hover time, and you'll be 17 000 feet -

ORION Understand. Okay, does that mean that we're going to be - at pitch over, we'll be steering from south to north?

CAPCOM That's affirmative.

ORION Okay, so at pitchover we'll be - you'll be targeting us right into the target, but we'll be steering from south to north. Is that based on Ken's tracking?

CAPCOM No, that's not - negative on that one. But you'll probably be coming straight in by the time you get down to pitchover.

ORION Okay, thank you. How did our landmark tracking turn out?

CAPCOM Stand by. Okay, the landmark tracking looked very good, John.

ORION Okay.

CAPCOM Orion, will you give us your ED bat readout, please.

ORION The same as always, 37 volts.

CAPCOM Very good.

ORION Jim, is guidance going to have any gyro drift force?

CAPCOM Stand by. Okay, no update on that. And it looks like your attitude for PDI is very close to the one that we'd like for the steerables so we'll try that when you come around at AOS.

ORION Okay, and Jim, on this P52. That radar has drifted up into the field of view, but it's no sweat just moving it down and smooth.

CAPCOM Okay, we copy.

ORION And one other thing that - when we put those state vectors in there, I guess we didn't have any LM vector in there, and my computer activity light stayed on all the time. I finally figured out what it was. I did a verb 66 and got rid of it.

CAPCOM Okay, we concur.

ORION I think that's what it was.

CAPCOM Everybody's nodding their head down here. Affirmative.

ORION Houston, 16 - what appears to be the problem with system A. Is it a reg problem or what?

CAPCOM Yes, that's affirmative, Charlie, a reg problem.

ORION Okay, will we have a - if we use up fuel - just system A for descent, is what you want us to do.

CAPCOM Stand by. We'll give you an RCS configuration for PDI when you all come around the corner.

ORION Okay, well, we'll be back. And I'd like somebody to think about this high APS pressure we have during the lunar stay. Over.

CAPCOM Okay, we're looking at that one too, John.

CAPCOM Okay, we are noticing an increase in the RCS pressure there, but we have enough ullage volume now to get all the propellant out.

ORION Understand. Thank you.

CAPCOM Orion, this is Houston. Have you -

ORION Yes, if we're -

CAPCOM Ever noticed any change in your YAW meter?

ORION Jim, it's stuck on minus 12.

CAPCOM Okay, and go ahead John.

ORION I think that if we're on OPS mike when we're talking to each other, I want to apologize right now. It's probably pretty interesting. Probably not if the comm was as bad as you said it was.

CAPCOM It was good enough for us to understand you.

ORION We were afraid of that.

CAPCOM Okay, Orion. If you see that reg pressure creeping up, you can do a small maneuver, which would help the situation.

ORION Understand, we'll do that. We'll do a verb 49 for the AGS cal attitude, Jim.

CAPCOM Okay. And Orion, we're coming up on about 2 minutes to LOS.

END OF TAPE

ORION Roger, 2 minutes to LOS. See you around for PDI.

CAPCOM Orion, this is Houston. For your information, the first disc pressure is 215 to 220 -- the RCS.

ORION Roger, understand.

ORION Jim, is it both system GC climbing?

CAPCOM Just system A.

ORION Just system A, right.

ORION Hey, Jim, I saw the landing site as we passed over. We're not going to have any trouble recognizing it from the rays. The rays stand out beautifully.

CAPCOM Very good. Glad to hear it.

PAO This is Apollo Control and both spacecraft have passed behind the moon during the end of the 12th lunar orbit. During this past, rather interesting front side pass, several nagging problems have cropped up or have been carried over from the preceding revolution. One concern is the landing radar which in its selftest mode gave some spurious readouts, the readouts never agreeing with what the test should be. Later on in a repetition of the landing radar selftest, the numbers on the onboard display came out as they should. John Young speculated that perhaps because of the low altitude at the time of the first attempt at the landing radar selftest, they were getting some ground reflections from the lunar surface which caused the selftest to be invalid. The selftest of the rendezvous radar has been postponed until the upcoming backside pass prior to acquisition on REF 13. The steerable antenna situation is still coming in and out as the steerable antenna appears to be locked in a stowed position. However, with the spacecraft attitude, oriented such that the antenna faces the earth, we've had fairly good communications during the better part of this front side pass. The 210 foot dish at Goldstone will acquire the spacecraft at the start of REF 13, and even if the steerable antenna is completely inoperative, all high bid rate data communications, voice, everything normally carried by the steerable antenna through the 85-foot dishes will be available on the ground. The lunar module reduction control system regulator situation, the crew is still running through some procedures to manage the two systems A and B of the reaction control system aboard the lunar module to balance the regulator pressures for the propellants. System A appears to creep upward slightly, periodically, and by opening the cross-feed valve, venting some of the propellant into the ascent tanks, it appears that the situation will stabilize. The descent propulsion system throttle check and the descent propulsion system pressurization routines were carried out completely normally earlier in revolution 12. Ken Mattingly, meanwhile,

PAO was given a go to circularize with the command module, Casper. Ignition time for this burn is 97 hours, 40 minutes 17 seconds. It will be a service propulsion system burn, 99.6 feet per second. We'll circularize at about 51.8 by 68.2. This is slightly elliptical but because of the perturbations of lunar orbit, the orbit of the command module should be almost circular at the time of rendezvous. Acquisition 43 minutes, 23 seconds from now, as both spacecraft coming around the front side. None of the problems mentioned with the RCA reaction control system regulators or the steerable antenna preclude the lunar landing. Even if the S-band -- steerable S-band antenna is completely inoperative, we're still go for landing using the OMNI antennas through the Goldstone 210 foot dish. 42 minutes 36 seconds away from acquisition on the PDI or landing orbit at 9728 ground elapsed time, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control at 98 hours 5 minutes ground elapsed time into the mission of Apollo 16. 3 minutes and 50 seconds to acquisition of signal; that is, the two spacecraft to come around the moon on the 13th lunar revolution. Some 29 minutes 24 seconds until ignition for the landing phase. Ignition time for PDI or power descent initiate is 98 35 04. The descent engine will burn for approximately 12 minutes 53 seconds. According to the nominal plan, for a total velocity change from orbital velocity all the way down to zero or landing at the lunar surface of 6698 feet per second. The lunar module Orion will slim down at a rate that would make a calorie counter envious for at the start of PDI, the Orion will weigh some 18 tons. By landing, she'll only weigh 9 tons. All of this weight loss, of course, is propellant. During the descent, the lunar module pilot will be calling out numbers that the computer display has displayed for him. He will call them out to the commander and both men will be in what is called a vox motor voice actuated communications so that those on the ground can hear their conversation. The lunar module pilot will call out these numbers for the angle at which the commander can see the landing site on a grid on his window called the landing point designator. During the final descent phase of the touchdown, the lunar module pilot will be calling out the landing radar readouts of H and H dot, that is altitude and descent rate respectively. The so-called low level of propellant quantities will be called out when the propellant quantities reach 5.8 percent. At that time, the burn time remaining will be approximately 111 seconds -- 91 seconds into this margin. There's a point called BINGO. This is the point where the commander has to make the decision to go ahead and land or to begin vertical motion and then abort stage in case it's a no/go situation on the landing. He has approximately 20 seconds to make this decision to land. The CAPCOM, in this case, Jim Irwin, or the Orion, will be make this call of level and BINGO to the crew at the appropriate times. Some 19 seconds away from predicted acquisition as Orion and Casper come around the moon and Casper meanwhile will have circularized. 25 minutes 47 seconds from ignition, We should have acquisition now. We're standing by for that.

END OF TAPE

PAO It remains to be seen whether the steerable antenna on the Orion is functioning properly as we come around on revolution 13. In any case, whether it works or not, we're still GO for landing at this point. Displays here in Mission Control have switched from the lunar orbit back ground projection plotters to the XY plotters of altitude, velocity and so on. Colored lines that are driven by radar, for the descent and landing phase. We have AOS in lunar module Orion. Let's switch on to air-ground.

CAPCOM Houston, I'm reading you. We want you to stay with the OMNI antenna.

CAPCOM Orion, this is Houston. How do you read?

CAPCOM Orion, this is Houston. How do you read?

CAPCOM Orion, this is Houston. How do you read?

ORION Hey, Ken. Go off (garble).

ORION Houston, Orion, over.

CAPCOM Orion, this is Houston. We read you rather weak. How do you read us?

ORION Roger, you 5 - 5, and command module can not (garble), and we're standing by for ya'lls decision with them, over.

CAPCOM Roger, understand you standing by. We want you to stay with the OMNI and we'll be requesting HIGH BIT rate shortly.

ORION Roger.

CAPCOM And we're ready for HIGH BIT rate now.

ORION Copy no CIRC.

CAPCOM We copy, no CIRC.

ORION Okay, you have HIGH BIT rate.

CAPCOM Okay, anticipate a wave off, for this one. We'll set you up for the next one.

ORION Okay.

ORION Hey, Ken's right out in front of us, maybe about a 600 feet, so we have a visual on him.

CAPCOM Okay, we copy.

ORION What attitude do you want us to go to for BIT.

CAPCOM Stay right where you are, John. It's sounds fairly good.

ORION Okay.

CAPCOM Orion, we have confirmed forward OMNI.

ORION Rog, that what you have, forward OMNI.

PAO Lunar module Orion has been advised of the possibility of a wave off for landing on this revolution. It seems that the circularization burn on the command module Casper was unsuccessful.

END OF TAPE

CAPCOM Orion this is Houston. We'd like you to go back to normal RCS configuration.

ORION Roger.

ORION Jim, be advised we had a couple of RCS Reg. A lights on the back side and my (garble) system is going out.

CAPCOM Roger. We copy, Charlie.

ORION Houston, how do you read over?

CAPCOM Orion, this is Houston. Read you loud and clear.

ORION I don't think we're going to have a remeeting problem here, but we're pointed right at him and as I look at him on my LPD ... Ken is out at 46 degrees and about, oh, I'd say 800 or 900 feet, maybe a 1000.

CAPCOM Roger. Can you see those booms that had the problem?

ORION Everything is retracted in the SIM bay.

CAPCOM Okay, we copy.

END OF TAPE

PAO This is Apollo Control. We are going around at least one more REV before attempting the power descent initiation for lunar module Orion. Ken Mattingly in command module Casper incountered some problems in preparing for the service propulsion system burn for the circularization maneuver. Seems that a secondary circuit on the thrust vector control system apparently did not come up to specifications. So the circularization burn was aborted, and we have a wave-off. We'll stand by for the remainder of this front side pass as a new circularization burn maneuver is calculated, and troubleshooting continued for Ken Mattingly and his problem aboard Casper.

CAPCOM Okay, go ahead 16.

ORION Alright, Jim. You guys working on some more pads and so forth.

CAPCOM Oh yea, we are, Charlie, and when you get a chance, we'll take your AGS now if you have those.

ORION Yea, sure do. Stand by.

ORION We'd like to PITCH down to keep Ken in sight, is that possible.

CAPCOM Okay, you are clear.

ORION Okay, starting with 540 minus 008 plus 001 plus 002 plus 006 plus 05 - correction plus 045 minus 088, and the initial numbers were the same as on the data card flow.

CAPCOM Okay, begining, it was a read back, begining at 540 minus 008 plus 001 plus 002 plus 006 plus 045 minus 088, and the inital values were the same as on the card, over.

ORION That's affirmative.

CAPCOM Okay, and on your RCS situation we suspect that the first DISK went back side. We would like to make sure that the system A pressure, when the sourse pressure in system A gets down to 500 PSI, we'd like you to close off system A, over.

ORION Roger.

END OF TAPE

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ORION When you say about pressure, you mean helium?

CAPCOM Affirmative.

ORION Okay, Jim, the helium is holding right up there. It's 2400 and that's where it was before we started getting off RCS flight. The pressure never has gone above about the 205, 210 maybe.

CAPCOM Okay, we copy.

ORION All right, Jim, give us a call when you want us to go to S-OMNI.

CAPCOM Roger, we sure will, Chuck.

ORION And have you got an LOS down for us?

CAPCOM Ken, is your PAN monitor on?

ORION Okay.

ORION Okay, we'll try our radar lockup here too again.

END OF TAPE

CAPCOM Okay Orion let's go a LOW bit rate.
PAO This is Apollo Control here at Mission Control. All of the --
PAO This is Apollo Control here in Mission Control. All of the options are being considered with the current situation in which the thrust vector control portion of the stabilization and control system, which in turn controls the firing and gimbaling of the service propulsion system engine. It's being mulled over. The other options would be rendezvous over the next couple revolutions and possibly using the descent propulsion system onboard Orion for injecting the spacecraft back into a transearth projectory. Over the next several hours this consideration should sort itself out.
CAPCOM (garble) again?
CAPCOM Orion go aft OMNI.
ORION (garble) Jim.
CAPCOM Roger.
CAPCOM Orion go LOW bit rate.
ORION We have LOW bit rate.
PAO This is Apollo Control at 98;37. The current situation in Apollo 16 is a waveoff. That is another revolution before attempting a landing.
CAPCOM (garble) Ken's trying to call you.
PAO However as mentioned earlier other options are being looked at in case the trouble shooting on the Command Module -- Command Service Module stabilization and control system fails to pan out to where the circularization burn or any other service propulsion system burns could be conducted successfully.
CAPCOM (garble) OMNI.
CAPCOM Orion forward OMNI.

END OF TAPE

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ORION Hey, that sounds pretty good. Houston,
how do you read Orion, over.

CAPCOM Read you loud and clear, Orion.

ORION Houston, this is Apollo 16 GARBLE. Heavy
background noise. (Garble) -- PDI. We'd like to try.

CAPCOM Orion this is Houston the propellant.

ORION Roger. We wonder if there is any possibility
of an answer on - we're going to do a P52 and get ready for
another PDI over.

CAPCOM Standby, we'll tell you.

CAPCOM Okay, Orion this is Houston you can go ahead
with your P52 ,John, we're thinking of having ya'll try to get
back closer together on the backside if GARBLE approach we
know some more ways we have and if later we decide on that PDI,
we'll have some more procedures for you.

ORION Understand.

END OF TAPE

ORION Understand.

PAO This is Apollo Control. There's a rather busy huddle around the flight director's console here at Mission Control as all the options for the current situation in the mission are considered. Shall we continue to troubleshoot the problem with the command service module stabilization control system or shall we proceed with rendezvous and a transearth injection burn at several hours hence. The possibility is still open for troubleshooting the problem with the system that controls the service propulsion system, and just landing at a later time. We are hopeful that before loss of signal on this 12th revolution of Apollo 16 that the decision will be made. At 9846, this is Apollo Control.

PAO This is Apollo Control. Spacecraft communicator Jim Irwin in the next few moments should pass up to the crew of Orion what the current thinking is here in the Control Room on attacking the problems that have arisen in the Apollo 16 mission.

END OF TAPE

PAO This is Apollo Control. Aboard the Command Module, Ken Mattingly is troubleshooting the SCS reading out what his onboard indications are. Let's listen to that for awhile, and switch our way from Orion.

CASPER I have no NTBC. I'm going clockwise on the translation head controller, mark it. I still have no NTBC. I'm bringing on the pitch 2 gimbal, mark. I'm checking the front wheel down to 0, up to 1, back to 1/2. The yaw front wheel is going over to 1 -- and I don't -- let me try it again. There it goes. I didn't have the motor on, I'm turning it off. I'll turn it on one more time. And stable. I'm taking the tram which is now set at a little one on the front wheel down towards 0. I move it slowly, it get's a little dynamics, and then it stops. I'm going to take it down to 0 at about this rate, it oscillates, and now it's diverging, and I'm turning the gimbel motor off. I'm going to hold in this configuration.

CAPCOM Roger, copy.

CAPCOM Ken, what we would like for you to do now, is crank up the yaw 2 gimbal again to that stable condition, and then let's see what MTVC does to it -- see if that will excite the oscillation.

CASPER It did last time. I now have the gimbal on again and I'm going to give it a little yaw and there it goes -- coming off mark.

CAPCOM Roger, copy.

CASPER Would you like to take a look at in accel command?

CAPCOM Standby.

CASPER Understand, standby.

CAPCOM Roger, Ken, go ahead and let's try in accel command.

CASPER Okay, and it's diverging all on it's on in accel command. I didn't put any inputs into it.

CAPCOM Roger, copy.

PAO This is Apollo Control 99 hours and 1 minute ground elapsed time. Flight Director Jerry Griffin is instructing the two spacecraft communicators to brief the crew on the current situation. And which apparently we have as long as 5 lunar orbits to make a determination on the feasibility of continuing with the landing, or whether we'll have to rendezvous with the two spacecraft back together, and do an immediate return to Earth. Assuming that the service propulsion system would be inoperative. We're some 14 minutes away from loss of signal with the Command Module. We will monitor the discussion between the spacecraft communicator, and the crew Orion, and Mattingly in Casper.

END OF TAPE

CAPCOM Hello, Orion and Casper, this is Houston. Roger. It looks like we're not going to have a decision on this REV and we do have a capability of spending about 5 REV's in this configuration before we have to make that decision. We would like you all to move into a station keeping position and you should be at the closest point of approach at about 100 hours, and we're recommending a CSM active to move into a position and to station keep and we're going to run some simulations down here on this TVC problem and get back to you.

CAPCOM Casper, this is Houston. You copied too, didn't you?

CASPER Roger. I'm waiting. I still have some of the gimbal motors on and the bus ties so stand by on that.

CAPCOM Okay, Ken. We'd like to try one more thing. There's a remote possibility that the RHC may be induced in some noise or transits into the system. We'd like you to kill all power to the RHC, turn off both AC and DC and repeat the gimbal check at an accel command and see if the gimbal takes off.

SC Okay, I secured the hand controller by just taking normal 2 power to OFF and the rest of the powers were OFF, I'm in accel command on YAW and I'm going number 2 up to start and it's in accel and it's stable. Would you like for me to try the thumb wheels.

CAPCOM Stand by one.

SC And with a little excitation from the thumb wheel it took off again.

CAPCOM Roger, understand.

CAPCOM Ken, for that rendezvous we're suggesting you use the procedure you worked on there in the simulator just move it in and when you're at closest approach.

SC Okay, Hank, we'll do that. Thank you.

CAPCOM Let me see if there's anything else they want to do with this gimbal thing before we shut it down. Stand by one.

CAPCOM Casper, Houston, we'd like you to try for our data, one more YAW primary, YAW secondary G&N servo loop check, gimbal check.

END OF TAPE

ORION Henry, did you say primary and secondary on this G&N drive?

CAPCOM Negative. Just a second there, I didn't mean to say primary.

ORION Okay. Can I turn the other three gimbal motors off?

CAPCOM Say that again. You were blocked out.

ORION I'd like to turn the other three gimbal motors off if we don't need them.

CAPCOM Roger. Go ahead and turn those off.

ORION Okay. I'm now at S and CMC control, I'm sitting up 204 and I have program 409 loaded.

ORION I'm starting gimbal number 2 yaw. Okay, it's stable now. I'm going to do a proceed on 204.

CAPCOM Roger.

ORION Well, it doesn't look like I got anything on time.

CAPCOM I think (garble) on G&N C control has it.

ORION Okay, let's try it again. Go back over everything.

ORION Okay, I'm coming up. I'm going to start it again and I'm going to try it. Now, as soon as I turn it -- well. My golly. it's dammed itself there. It started out wild and it's settled down. Now (garble) I'm going to proceed on 204.

CAPCOM Roger.

ORION Plus 2 and it's oscillating minus 2 and it's oscillating about 1 degree each and it's oscillating in the center. It is not divergent however, now it's gone to trim and it's oscillating about plus or minus almost 2 degrees or plus or minus 1 degree. I'm going to turn it off, mark.

CAPCOM Roger, copy.

PAO This is Apollo control at 99 hours 11 minutes into the mission of Apollo 16. To recap the current situation, the crews of both vehicles Casper and Orion have been instructed to station keep as they come to their closest approach during the next pass behind the moon, with the command service module being active in the rendezvous. We have some five hours to resolve the current problem which consists of difficulty by Ken Mattingly in getting the thrust vector control system which keeps the service propulsion engine aligned through the center of gravity on the command service module. At the same time people on the ground, here in mission control and over in the training building are running simulations to attempt to

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PAO develop a bypass or a workaround for the situation that Ken Mattingly has encountered and as preparations for the circularization burn. Some 3 minutes away from loss of signal.

CAPCOM I bet if I was at the average g killed your EMP.

END OF TAPE

CASPER Okay, thank you.

PAO This is Apollo Control. One slight correction We have 5 revolutions which amounts to 10 hours in which to make the decision before the geometry of the two spacecraft orbits would dictate no landing, would be out of plane with the landing site beyond the capability of the descent propulsion system to steer into the landing site. To repeat again, that is 5 revolutions instead of 5 hours.

CAPCOM Casper, Houston, we are about 2 minutes from LOS and when you come around next time in that rendezvous just come up on the best OMNI, then we'll get high gain from there.

CASPER Okay, Hank, and is there anything else that you can think of we can do? We might try and take a look at otherwise we'll just be station keeping a hundred feet or --

CAPCOM We can't think of anything else down here Ken.

CASPER Okay, thank you sir. See you in a few minutes.

CAPCOM Ken, for your info we uplinked a new vector to the LM and we weren't able to get yours in so there will be a small difference, a couple feet per second.

PAO This is Apollo Control. We've had loss of signal near the end of the 13th lunar revolution as both spacecraft go around the back of the Moon. Flight Director Gerry Griffin is having what he calls a tag up with all of the console positions here in the control center for a discussion of the current situation in Apollo 16. We've had a wave off so far. That is the current posture of the mission. Crew will rendezvous at the next closest approach time and station keep until such time as the resolution is made here on the ground whether or not to continue the mission or to re-rendezvous, dock and do an immediate transearth injection burn. They're attempting to work around the problem and the command service module thrust vector control circuitry, which apparently bombed out on Ken Mattingly when he was preparing for his circularization burn. We have some ----

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/20/72 CST 3:12 GET 99:18 335/1

PAO We have some five revolutions in which
the decision can be made before it would be a definite no go
for landing. At 99:18 and 46 minutes away from acquisition
on REV 14 this is Apollo Control.

END OF TAPE

PAO this is Apollo Control, 99 hours 31 minutes ground elapsed time into the mission of Apollo 16. To recap the current situation here in Mission Control Center, various considerations are underway on whether or not to continue the mission with a later landing or to have the 2 spacecrafts, Orion and Casper, rendezvous, dock and do a transearth injection burn using the lunar modules' descent propulsion system, this would assume of course that the service propulsion system on the command module is inoperative, because of the apparent problem in the SCS or stabilization control system, which in turn drives and controls the SPS system, aboard the command service module. We have something in the neighborhood of 5 revolutions or about 10 hours in which to reach the decision on the outcome of the lunar landing. As Orion came around the East limb of the Moon this last revolution in preparation for power descent initiation, they were prepared for the landing however Casper, piloted by Ken Mattingly, reported that he had not made the circularization burn. Since that time there have been many huddles here in the control room engineers are going over drawings in the back rooms simulations are underway here at the Manned Spacecraft Center to determine the nature of the service propulsion system control problem and hopefully by the time the crew comes around the corner again some 31 minutes from now at least some clarity will come out of the situation. But as mentioned earlier it may take the entire 5 revolutions. The limit of 5 revolutions has to do with the orbital geometry because after that time the orbital plain of the lunar module would be -- would have drifted so far away from the landing site that the -- there's not ample propellant to steer into the Descartes landing area from the present orbit without a plain change. At 99:34 and 30 minutes and 30 seconds from acquisition of signal both spacecrafts this is Apollo control.

END OF TAPE

PAO This is Apollo control 99 hours 56 minutes ground elapsed time into the mission of Apollo 16. Some 7 minutes 40 seconds away from acquisition on the 14th lunar revolution. To recap again the current situation in the mission, the circularization burn for command module Casper was aborted when Ken Mattingly discovered some discrepancies in the backup system which control the service propulsion engine. We still have a good prime system, that is a guidance and navigation system aboard the command module, however, we would be one failure away for the very critical transearth injection maneuver which requires a fairly lengthy burn and a stable engine bell from the service propulsion system; therefore, quite a few people here in Houston and at the spacecraft manufacturer in Downy California are looking into the ramifications of the backup system having apparently failed would this present any structural strain on the spacecraft if the engine bell went to full YAW, and would we be able to do a successful transearth injection with this engine. As all of these questions are answered the decision will be made whether or not to continue with the landing phase or to rendezvous and do a transearth injection burn using the descent engine on the lunar module, Orion. We have about 5 revolutions or some 10 hours in total time in which to make this decision. This, again, is dictated by the orbital mechanics. The fact that the lunar module would drift away from the desired ground track for the landing site at Descartes during any time passed these 5 revolutions. The gold team of flight controllers will stay on duty in the control center for the landing if a decision is made to land. If the decision is made to rendezvous and do a docked descent propulsion burn to bring the spacecraft home. Pete Frank's orange team will take over. Some 4 minutes 37 seconds now away from acquisition and at 100 hours even this is Apollo control.

END OF TAPE

PAO This is Apollo control 100 hours 3 minutes ground elapsed time. Less than a minutes away from acquisition of Orion and Casper coming around the east Lim of the Moon on the 14th lunar revolution. Standing by for acquisition here half a minute away. The atmosphere here in the control room is reminiscent of the period just after the cryogenic oxygen tank incident on Apollo 13, 10 seconds. We're waiting confirmation from the network controller that we've had acquisition. We have AOS, lunar module. Lets stand by now for resumption of communications between the control center, Jim Irwin capcom and the crew of Casper and Orion.

ORION Houston, Orion, how do you read.

CAPCOM Orion, this is Houston reading you loud and clear.

ORION Roger, sameo Jim. We're about seven tenths of a mile out from Casper now.

CAPCOM Say again, Charlie. We still have excessive noise noise down here.

ORION I say our range to Casper is about seven-tenths of a mile.

ORION And he's opening at 2 1/2 he put in some possible velicity to go up and above and come down and get with us.

CAPCOM Okay, we copy.

ORION The total is sliding.

CAPCOM Okay 16 this is Houston. We still do not have an answer. The people of working very feverishly.

ORION Orion, roger. Okay thank you. It'll probably be awhile before we get station keep it anyway.

CAPCOM Roger.

CAPCOM Stand by, Ken.

ORION Houston, Orion.

CAPCOM Go ahead, Orion.

ORION Okay, we've got a RCS system A red light. Pressure helium is looking like ...

END OF TAPE

ORION Okay, we got an RCS system A reg light Pressure helium is looking like 2300. The propellant is at 210, the fuel manifold is ox manifold correction, make it 215 or 220, and everything else looks pretty good. Pressures are holding up a - do you think the VERB system is gone?

CAPCOM Roger, it looks that way to us, Charlie.

CAPCOM Yes, Casper, this is Houston. Read you loud and clear.

CASPER Okay.

CAPCOM Roger we copy, Ken?

CAPCOM Orion, this is Houston, we're wondering where you got the estimate of seven tenths of a nautical mile range?

ORION We got the rendezvous radar locked on it. Do you want us to turn it off?

CAPCOM No, that's fine.

ORION Houston, Orion, John and I have been talking about if we get the land this thing, we'd like to probably ought to think about going to sleep first and then we'd get up in a full EVA tomorrow.

CAPCOM Roger, we concur down here.

CAPCOM Okay, Casper, this is Houston. We're recommending that you null the line of sight rates and fire 5 feet per second toward the LM.

END OF TAPE

CAPCOM We copy you, Ken.
CAPCOM Okay, Ken, we show you coming up on perilune now, so it'll be effecting your apolune.
CASPER That's affirmed.
CAPCOM Okay, that sounds good Ken. By the way, we're hoping that -- we think your state vector was fairly accurate, Ken. And you'll be at perilune in 15 minutes.
CASPER That's affirmative.
CAPCOM Ken, can you give us your position relative to the LM?
CASPER Yeah, he's ahead of us, and I show him about level and 6500 feet out and opening at 3 feet a second.
CAPCOM Okay, we copy your position, he's ahead, below and about one nautical mile.
CASPER And he's opening at 2 1/2 on 1678.
CAPCOM Roger.
CASPER Three feet a second on the tape meter.
CAPCOM Okay, stand by.
CASPER Okay, on the COAS, I've got him bore sighted there and he's 355 59 from local vertical.
CAPCOM Okay, Casper, this is Houston, we're convinced that we want you to fire directly at the LM -- about 5 feet per second. We want to get a positive close-in rate.

END OF TAPE

CAPCOM We're convinced that we want you to fire directly at the LM, about 5 feet per second. We want to get a positive closing rate.

SC Okay, it looks like the DAP isn't stable now, how about if I give it a VERB 46?

CAPCOM Roger, we copy.

SC Is that a good idea?

CAPCOM Ken, we show you in 3.

SC I am now but I wasn't

CAPCOM Okay.

SC Does that mean I'm clear to do a VERB 46?
Okay. No that still doesn't work. I thought maybe I had one of those transients. For some reason everytime we pick up CM/C/O.
(Garble)

CAPCOM Orion, lets go low bit rate.

ORION You have it.

SC Okay I got it under control Jim, I had a bad DAP.

END OF TAPE

PAO A maneuver Mattingly was attempting was a 5 foot per second line of site RCS maneuver toward the lunar module right now he's ahead and below the lunar module by about one nautical mile straight line distance. We would like to reemphasize that this will be strictly for a station keeping lunar landing is still not positively ruled out at this time depending on what decision is made on the - with reliability of the stabilization and control system to control the SPS engine on the service module. Continuing to monitor air ground from both spacecraft this is Apollo control 100 hours 24 minutes.

ORION (Garble).

CAPCOM (Garble).

ORION Okay, I guess - Houston do you want me to line of sight all the way in.

CAPCOM Give me the range and range rate reading now.

ORION Roger that's (garble). 10 000 feet loading at 3 feet a second and we have a line of site ready.

CAPCOM Ready to copy.

CASPER Roger Charlie I'm standing by for instructions.

CAPCOM Yes Casper this is Houston. You should know the line of site rates.

CASPER Okay, you want me to keep them null and go all the way in. Is that the idea?

CAPCOM Roger, keep a positive closing rate.

CASPER Okay, might be expensive but we'll do that.

ORION Okay, why don't you tell me what to do there, John.

ORION Okay. Thrust down and I'll tell you which way the needle moves.

ORION That's the wrong way, Ken.

CASPER That's sure towards the Moon.

ORION Were you thrusting?

CASPER That's affirm.

ORION Okay, thrust away from the Moon. That's doing it - a little more. You didn't get it corrected, Ken.

CASPER How's that now?

ORION Alright it's just not moving very much at all.

CASPER Okay, that's a good place to stop.

ORION No, it's going to be expensive to do this, but your going to have to thrust up.

CASPER Okay, I just need some guides as to when I've got it null.

ORION Okay, you don't have it null.

CASPER How's that?

ORION That's - you've got (garble).

CASPER How the range rate.
ORION 3 feet a second close.
CASPER Okay.
ORION Your at 66 RC.
CASPER Still going down?
ORION That's affirmative. You've got it to
3 milliradiance you've got it to 2 milliradiance, you've got
it to 2 milliradiance - now you've got it, Ken killed it.
CASPER Okay.
CASPER Looks to me now like I'm drifting the
other way.
ORION Not according to my needle.

END OF TAPE

CASPER It seems now like I'm drifting the other
way.
ORION Not according to my needles.
CASPER Okay, I'll believe your needles.
CASPER (garble)
ORION Three and a half feet a second, and you've
6,300 feet.
CASPER Okay.
ORION (garble) activity here, so I can tell what
(garble)
ORION Okay, you're rates are nulled essentially.
CASPER Okay. Thank you.
CAPCOM Orion, request to you select the secondary
transmitting receiver.
CASPER Okay, Houston, the Orion said that they had
already selected the secondary.
ORION Okay, Houston, how do you read now?
CAPCOM I read you loud and clear, Orion.
ORION Okay, you're 5 by.
ORION How's the problem looking?
CAPCOM 16, no answers yet, we're still looking at
it.
ORION Okay, Ken, you're at 5600 feet closing at
4 feet per second.
CASPER Okay.
CAPCOM Okay, Orion, this is Houston. We would like
you to open the primary power amp circuit breaker on 16.
ORION It's open, Jim.
CAPCOM Okay, Orion, let's go high bit rate.

END OF TAPE

CAPCOM Okay, Orion, lets go high bit rate.
ORION Right, you have high bit rate.
CAPCOM Roger.
ORION Gee, Ken, you're getting a line of sight
rate you're going to have to thrust a little towards the Moon.
Can we try this?
CAPCOM Okay, we can't hold high bit rate, request
you go back to low bit rate, Orion.
CASPER that the right direction.
ORION Needles didn't move, Ken.
CASPER That's the right direction.
CASPER Okay, that's up for me it looks like it
ought to be down for you.
CAPCOM That sounds pretty good, Ken.
CASPER Okay.
CAPCOM Orion, this is Houston, could you give us
a range and range rate readout?
ORION Okay, 4900 feet, closing at 5.
CAPCOM Okay, 4900 closing at 5.
ORION You got the line of sight rate (garble) now,
Ken.
CASPER Okay. Man this is expensive.
ORION Range nulled again.
CAPCOM They are nulled right now.
ORION Okay. We're going to keep going this way
and can we have some fuel point at which to cut off and switch
over to LM power?
CASPER Might be you can use it.
CASPER It's really showing and I don't know how
many more we're going to see on our way in. I'm reading --
of course the gages don't tell you exactly what it is but I
have -- it's 65% you will not need. And all this stuff that's
going to be in the lead plain, Houston, you got any thoughts
on a cut off point on the RCS.
CAPCOM Stand by, Ken. Okay, well your at 4,000
feet now at 5 feet a second, Ken.
CASPER Okay, don't believe the instruments--
CAPCOM And your line of sight rate is starting
to build a little in the other direction. You've got it now.

END OF TAPE

CAPCOM Orion, this is Houston. Is the CSM above you or below you? We hope he's directly ahead.
ORION He's 45 degrees above us.
CAPCOM 45 degrees above.
ORION Above the local vertical.
CAPCOM Roger.
ORION And he's got a 5 foot a second close rate and his line of sight annulled on the radar.
CAPCOM Roger.
CASPER And they look like they're killed completely on the optics too. Going to need your checker light here in a minute. You're just getting a little glance on right now. Okay, thank you.
ORION Boy those rates look steady as they can be.
ORION And we really got it killed.
ORION (garbled)
ORION And I guess we'll just come up along side (garbled)
ORION That seems like a fair thing
CASPER Alright.
ORION Hey, Ken, you're going to have to thrust down a hair.
CASPER Down to your right.
ORION (garbled)
CASPER Yeah, that's what I mean. You would thrust up. Okay, I think I got it killed again.
ORION Looks pretty good.
CASPER What's that closure rate now?
ORION 0 5 feet a second. You're off 3 and a half feet a second now at 3000.
CASPER 3 and a half feet per second.
ORION Roger.
CASPER Okay, all I've got is the tracking light on, I've lost the rest of your image.
ORION You're gonna have to thrust a little more to kill that rate the same way.
ORION Okay, that got a lot of it, but not all of it.
ORION Okay, you got most of it.
CAPCOM Okay, Casper, this is Houston, you might pick up a temperature caution light on your Quads but it's of no consequence.
CASPER Okay, yeah I see B is up high, is that due to the thruster activity.
CAPCOM Affirmative, Ken.
CASPER Or is that due to heater?
CAPCOM I think it is thruster activity.
CASPER Rog.

CAPCOM Orion, this is Houston. Will you give us another range and range rate, John?
ORION We have 3100 feet at 3 and a half.
CAPCOM Okay, 3100 at 3 and a half.
ORION Roger, at angle 68 degrees to local vertical now.
CAPCOM Understand 68 degrees.
ORION Okay, Ken you got a slight rate going to the south according to my needle.
CASPER Okay, let's watch that (garbled) before I start working on it, we haven't had any (garbled) to pull up before
CASPER How's the line of sight rate doing now, over.
ORION Holding, the vertical is holding right on.
CASPER Yeah, and range rate?
ORION You're at 3000 feet at 3 feet a second.
CASPER Okay.
ORION 4800 feet.
CASPER Well, we must be going in the right direction.
ORION Yeah, you're going to get there.
CASPER Yup.
ORION You better have 2 miliratings to the south.

END OF TAPE

CAPCOM You do have 2 miliratings south.
CASPER Okay, I'll take some of that out. That
means I go to the south right?
CAPCOM Yes.
CASPER (garble)
CAPCOM Yes, that's got most of it.
CAPCOM Go ahead.
CASPER (garble)
CASPER (garble) lower engines.
CAPCOM Okay, that's got it, Ken.
CASPER Okay.
CASPER Okay, it looks like I'm picking up a rate
in the opposite direction in the inflight gimbal.
CAPCOM No, your not -- you don't have any rate
yet.
CASPER Okay.
CAPCOM According to my needles.
CASPER Alright. This is very much like the
(garble) whether, because of the deadband laying here. It looks
like it takes a long time to pick up one of those readings.
CAPCOM Orion, this is Houston, we want you to
get the rendezvous radar and the tracking light off as soon
as it's feasible, it's to conserve power.
ORION Roger, we will. It's not feasible right
now.
CAPCOM Well we understand.
CASPER Okay it looks like I may be a little more
to the south. Okay, Houston (garble)
CASPER (garble)
ORION Well our needles don't show it.
CASPER Okay.
CASPER Gee, I show quite a drift rate now, Joe.
You still show no out of rate
CAPCOM Yeah, I don't show any and I've got you bore
sighted (garble) in that hole and I don't show in motion there
either, Just a little south, Ken

END OF TAPE

ORION Just a little now, Ken.
CASPER Okay, just like -- now I'm going to take some of that out.
PAO This is Apollo Control. Flight Director, Jerry Griffin, has instructed the CAPCOM to tell the crew that at acquisition of signal on rev 15 -- that's in spite of the next revolution -- they'll be given a go no go for a landing on rev 16. Hopefully by that time the situation will have resolved itself on the thrust vector control system which drives the SPS. Apparently there is a problem in the yaw gimbal actuator in the service propulsion system. The decision has not yet been made, and hopefully will be made prior to the time of acquisition of signal on revolution 15. Some 19 minutes remaining in this 14th revolution. Add to that 47 minutes of backside pass, and at -- start of that rev we'll either be go for landing for immediate rendezvous docking, and subsequent return home. This is Apollo Control at 100 hours 51 minutes.
ORION (garble) closure rate.
CASPER John, put a second on the tape meter. It didn't close the first half.
ORION Well, that's what I was just wondering -- need a little more plus X.
CASPER Okay, say when and how much.
ORION Okay, I'm going to put in foot plus X. Okay. As long as we're using brut force we might as well.
CASPER Okay.
ORION Okay, that's about a foot.
CASPER Okay, you're 10 000 feet at 2.
CASPER There you go -- it worked!
ORION How about that?
CASPER Yeah, I can see the LM in earth shine now.
ORION Okay, fine. You're getting over behind us Ken, you're going to have to thrust toward us a little more.
CASPER Okay, what's my range rate now?
ORION You're at 2000 feet, but it's hard to close in all.
CASPER Okay, give me another foot. You can add another foot per second.
ORION Okay.
CASPER Now you're starting to build a rate to the north.
ORION I don't think those people are as good (garble)
CASPER Yeah, I don't think you're quite as good.
ORION It just looks like I need to start reversing my (garble) plane direction. Do I have a positive closure rate.
CASPER Yep, 3 feet a second, 10 000 feet.
ORION Okay.

END OF TAPE

ORION Okay, Ken you are moving toward us
definitely.

CASPER Okay. I'm getting you centered back up
with the COAS.

ORION Okay.

CASPER Hey you guys do I have a closure rate.

ORION Say again.

CASPER Do I still have a closure rate?

ORION That's affirmative 2 feet a second.

CASPER Okay. Looks like the old CMS is just
sort of sitting here looking at itself. I'm going to go
ahead and use the CMS (garble) COAS on this thing. That's
working out pretty good, here. I think it's the (garble)
indicator out of line.

ORION Okay, you've got 4 milliradiance so far.
Your at 1500 feet now

CASPER I'm just barely drifting in my COAS,
looks pretty good here.

ORION Okay, we'll just drifting in my COAS. You
pretty good here. Do you see me at all.

CASPER Yes sir and in your side I can see the
LM there.

ORION Fine.

CASPER (Garble).

ORION Just a few feet a second, Ken your about
1400 feet now.

CASPER Okay. (Garble).

ORION Okay, and I'd say you were more (garble)
and I see you drifting slowly across the (garble).

CASPER Rog, and I can't (garble).

CASPER (Garble).

ORION Yes, it's still 3 milliradiance lower.

CASPER Okay.

CAPCOM Orion, this is Houston. We're showing
about 10 minutes to LOS and I have some words for you on our
general plan when it's convenient.

ORION Go ahead.

CAPCOM Okay, when you come up on AOS on the next
REV, REV 15, we'll give you a go or no go for another try.
And we'll be looking at PDI at REV 16 and at that time we'd
have pads for you on procedures. Over.

ORION Okay.

CAPCOM And, Casper, this is Houston.

CASPER Go right ahead.

CAPCOM Roger, we want you to verify that your
in AUTO dump on the water. That's pressure relieve ...

END OF TAPE

CAPCOM This is Houston.
CASPER Go right ahead.
CAPCOM Roger. We want you to verify that you're
in auto dump on the water, that's pressure relief in a number
2 position, that's vertical. And if you have an opportunity
to get away from the controls there we'd like you to manually
dump the water to 10% on the backside. That should require
about 17 minutes. Over.
CASPER Okay, I am in auto dump and I'll have to
wait till we get daylight to go down there I think --
CAPCOM Did you copy.
CASPER (garble)
ORION Okay, Ken, the line of sight range is
starting to -- You'll have to thrust down a little -- I mean up
a little. That fixed it.
CASPER Okay. (garble)
ORION (garble) 25 feet per second. You're at a
thousand feet approaching.
CASPER (Garble)
ORION (Garble)
CAPCOM Orion, this is Houston, we'd like you to
configure for RCS Bravo, only. Over.
ORION Roger, will open the (garble) crossfeed and
pull (garble)
ORION We're Configured.
ORION Okay, 990 feet now.
CASPER Roger.
CASPER (garble) Got the line of sight range?
ORION (garble)
CASPER (garble)
CASPER Houston, Casper. (garble)
CASPER (garble)

END OF TAPE

CASPER (Garble) COAS here
ORION You're upside down compared to (garble).
CAPCOM 16, this is Houston. We're showing about
2 minutes until LOS and if you give us a range and range rate,
and Ken perhaps you can repeat it for us.
ORION Okay, 710 feet closing 2 feet a second
rate is null.
CASPER Did you copy that Houston. The range is
710 feet feet per second the rate is null. Houston, do you
copy Casper.
CAPCOM Roger, we copied down here, thank you.
CASPER Okay.
CASPER Okay.
ORION Yes, I can tell that I've got you, but
it's Earthshine (garble). Rog. all sorts of (garble).
ORION Okay I have good comm. Man you just
disappear got the spotlight on. I tell you the spotlight isn't
nearly as good as earthshine, I'm really surprised.
PAO This is Apollo control. We have loss of
signal with both vehicles as they pass behind the Moon during
the end of revolution number 14. At the start of revolution
15 the crew of Apollo 16 still at this time station keeping
in the two vehicles will be given a GO/NO-GO decision for
power descent and landing during rev 16 which will be some
4 hours from now. If the decision is go and all of the
maneuver timelines will have to be read up to the crew during
the front side pass of revolution number 15. If the decision
is no landing then the crew would procede to rendezvous, dock,
and prepare the spacecraft for return home. To recap the
situation the planned circularization maneuver by the command
service module back prior to AOS on revolution 13 was aborted
by Ken Mattingly when he discovered that the backup system,
the stabilization and control system which in turn controls
the gimbal actuators on the service propulsion system ap-
parently had a malfunction in the YAW direction in other words
the driver that moves the engine bell left and right apparently
had some excursions of several degrees and fairly rapid
amplitude, fairly rapid succession. Simulations are underway
here at Houston and the command module simulator and some
structural tests are underway at this time at the manufacturers
plant Downey in California to determine if indeed the problem
would present any structural hazard to the spacecraft should
the backup SCS system have to be used in SPS burns, keep in
mind please that the primary system the G&N system is still
in perfect condition, but the mission rules call for both
systems being operational before we have a go for landing.
Some 44 minutes remaining now until acquisition and rev 15
during the next three quarters of an hour the decision should
be firmed up on a go for landing GO/NO-GO decision. And at
101 hours 14 minutes ground elapsed time into the mission of
Apollo 16. This is Apollo control

END OF TAPE

PAO This is Apollo Control 101 hours 44 minutes into the mission of Apollo 16. 14 minutes before the start of revolution number 14 around the Moon. At which time shortly after the spacecraft, which now should be nose to nose station keeping, will come around the east limb of the Moon. They will be given a GO NO/GO decision from the ground on whether or not to make the landing during the succeeding rev - revolution, or lunar orbit number 16. To recap again, the source of the current situation and delaying the landing, the secondary or back up system, which actually acts as a tillar for the large 20 000 pound thrust engine in the service propulsion system, or the main engine on the command service module, has experienced some difficulties in the YAW mode or the left and right motion of the engine. The engine is moved up and down, left and right by what are called gimbal actuators. This back up system in the command module guidance equipment is used if there is a failure in the primary system, which is called the guidance and navigation, or the G&N system. And the flight mission rules call for both systems to be functioning perfectly before a landing is committed. Simulations at the manufacturers plant in California and in the command module simulators here in Houston have been under way for the last several hours to determine the possible effects of having this oscillation - left to right oscillation - by the engine, whether or not it would damage the spacecraft structurally. Some initial times have been generated here by the Flight Dynamics people on the maneuvers for a landing should the decision be made to continue with the landing. The command module circularization burn would be made at 1:03, 22:05. The power descent ignition or the start of the landing phase would be at 104, 17:20 ground elapsed time. These times are subject to change within a few seconds one way or another. To repeat again, some 11 minutes from now the two spacecraft will come around the front side to start a lunar orbit number 15. The spacecraft communicator will pass up to the crew the GO NO/GO decision for landing during revolution number 16. The crew has requested that if a landing is made that the EVA be postponed until after they can have a sleep period.

END OF TAPE

PAO This is Apollo Control 101 hours 50 minutes ground elapsed time. Manned Spacecraft Center Director, Dr. Christopher C. Kraft, Jr., just came back into the control center after having attended the meeting by management people in one of the back rooms, and the situation is go for landing. To reaffirm we do have a go for landing in revolution number 16. That decision will be passed up to the crew at acquisition of signal some 7 minutes from now as they come around the front side of the Moon. The new maneuver, timewise, will be read up to the crew for circularization by the Command Module and power descent and landing by Lunar Module Orion. To repeat again -- we are go for landing. This Apollo Control at 101:51.

END OF TAPE

PAO this is Apollo Control, 101 hours 56 minutes ground elapsed time in the mission of Apollo 16. Less than 2 minutes prior to acquisition of signal with Orion and Casper coming around from the rear face of the Moon. On the 15th revolution. As the conversation begins with the crew the word that we're go for landing will be passed up to the crew. Apparently during the simulations here and Downy in California it has been determined that the oscillations in the backup control system which controls the motion of the large engine on the service propulsion system, would present no structural hazard to the spacecraft. The backup system is go at this time and we've had no problem at all with the primary system, the G&N system as it's called. To repeat again the preliminary time for the command module circularization burn would be 103:2205 for the power descent initiation 104:1720. Standing by for acquisition some 20 seconds from now. Ten seconds away. New flight control team schedule being posted on one of the Idefor projectors.

PAO you hear noise on the down link, waiting for confirmation from the network controller that we have solid lock on with the spacecraft.

ORION We got AOS, lets see.

CAPCOM Orion, this is Houston,

ORION Hello, Houston.

CAPCOM Roger, I have some switches and circuit breakers we want you to take care of to try to improve the comm situation. I'll give them to as soon as you're ready to copy.

ORION Go ahead.

CAPCOM Okay, we want on panel 12 track mode switch OFF, on panel 16 primary transmitter receiver circuit breaker open, S-Band antenna heater circuit breaker open, S-Band antenna comm circuit breaker open, and primary S-band power amplifier open, then on panel 11 ac buss S-Band antenna open. Over.

ORION Okay, turn off the track mode on 12 track mode OFF, is that right Jim?

CAPCOM That's right, track mode switch OFF on panel 12.

ORION Okay, you'll have to find another name for that switch--oh okay we got it.

CAPCOM It's been a long day. And Did you copy those circuit breakers, Charlie?

ORION He's got them, we'll get them now.

CAPCOM Okay, and you do have a go for another try here at PDI on REV 16 and I have some words on that problem with the PBC whenever you all are ready to copy.

ORION Well I'm all ears, I don't know about, Ken.

CASPER Looks, good.

APOLLO 16 MISSION COMMENTARY 4/20/72 CST 17:50 GET 101:56 MC-353/2

CAPCOM Okay, Orion can always tell Casper what his problem is but it looks like an open circuit in the rate feedback and your servo loop. We've run exhaustive test down here on the West coast and the East coast, and controllability aspect on structural aspect and everything looked---

END OF TAPE

CAPCOM Out here in the west coast, on the east coast on controlability aspects and structural ability aspects. Everything looks satisfactory. On Apollo 9 we ran a similar test - was run as you probably remember and if such a - such a problem did occur up there, you could expect oscillation the course of the gimbal but you could expect a steady attitude there would be a limit cycle. So we're convinced down here that we have a satisfactory control mode if we have to revert to that one. Over.

ORION (garble, heavy background noise.)

CAPCOM Yeah, I hope Casper caught it.

ORION Okay, Jim one thing - Jim, could you go through that switch just one more time - CB list one more time a little bit slower?

CAPCOM Okay, Charlie on the circuit breaker list on panel 16 it was primary (garble) S-band antenna heater, S-band antenna comm, primary S-band power N and then on panel 11 just one AC buss S-band antenna -

ORION Okay, we've got them all.

CAPCOM Okay, understand that's complete -

CAPCOM Okay (garble) let me give you some (garble) on this rev - read some pads up to you that will update and then we want you to repeat them to Oscar 1 and then you'll pick up on the timeline book thats (faded out).

ORION Roger, copy.

CAPCOM And some more information, if you'd like to copy it I have two sets 102 3550 and perform 400 plus 3 after the P52 and for the P52 use the same stars as the P52 in the timeline book. And, of course, after the uplinks to you VERB 47, over.

ORION Right, we copy all of that one thing you want us to do option 3 before the option 1?

CAPCOM Negative, just the option 1.

ORION Okay, okay, we're ready to copy.

CAPCOM Okay, we're standing by for the pads.

ORION All right, and -

CAPCOM Orion, will you turn S-band ranging switch OFF?

ORION Ranging is OFF.

CAPCOM Let's go high bit rate.

ORION You are high bit rate.

ORION Is Casper going to get a little sep maneuver here?

CAPCOM Yes, we'll be giving that and I have T2, T3 aborts pads, if you're ready to copy Charlie.

ORION Stand by. Okay, go ahead.

CAPCOM Okay. Lima 10442 1664 111 03 30 00 T2 at PDI plus 24 plus 54 and then T3, vector 106 25 11 81, over.

END OF TAPE

CAPCOM -- 81, over.
ORION Alright, same thing on Mike again.
CAPCOM Okay, Lima is 104 42 16 64, over.
ORION Copy that, also Mike.
CAPCOM Okay, Mike is 111 03 30 00, over.
ORION Okay, copy P2 it would be TEI plus 2454,
and we have Lima 104 42 16 64 111 03 30 00, November 106 25
17 81, over.
CAPCOM Roger, on November there it's seconds 1181,
over.
ORION Copy, 11.
CAPCOM And I have the PDI pad when you're ready.
ORION Go ahead.
CAPCOM Okay, here's India first. 104 17 23 29 11
04 plus 000 36 002 114 340 plus 56 980. Juliett 107 05 45 00.
Kilo 109 04 3000, over.
ORION Copy PDI pad. 104 17 23 29 11 00 plus 000
36 002 114 340 plus 56 980, 107 05 45 00 109 04 3000, over.
CAPCOM Roger, and now I have the note PDI plus 12.
Orion, we've turned the biomed off.
ORION Okay, go ahead. Okay, you got the old bio-
med off.
CAPCOM Okay, and here's note PDI plus 12 104 30
all zeroes, plus 01 023 plus all zeroes, minus 005 00 01384
plus 00 114 0 11 39 035 all zeroes, 271 08700 plus 01 026 all
zeroes minus 00 494 105 18 all zeroes 107 05 45 00. Throttle
profile 10% in 26 seconds pull throttle for remainder. Over.
ORION Roger, copy. Give me the noun 42 begin,
over.
CAPCOM Roger, noun 42. 013 84 plus 00 114 011 39
over.
ORION Roger, copy 104 30 0000 plus 01 023 plus
all zeroes, minus 005 00 01384 plus 00 114 0 11 39 035 000 271
08700 01 026 plus all zeroes minus 00 494 105 18 0000 107 05
45 00 --

END OF TAPE

ORION 00 494 105 18 0000 107 05 4500, over.
CAPCOM Good, readback, Charlie. I have AGS support conscience when you're ready.

ORION Stand by. Okay, I'm ready to copy.

CAPCOM Okay, Orion, we're going to hold up, we've got to get some high bit rates. Orion, select down voice back up.

ORION Houston, how do you read down voice back up, over.

CAPCOM Orion, this is Houston, I read you very very weak. We want you to go to P00 and data, we're going to send you some uplinks and we do not want you to transmit until the uplinks are complete.

ORION Understand, we have P00 and data.

CAPCOM Orion, we want you to go to down voice back up.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/20/72 CST 18:10 GET 102:16 357/1

CAPCOM Orion, this is Houston with the new set
pad and circ pad whenever you are ready.

ORION Okay we're still getting uplink.

CAPCOM Okay, no transmission.

CAPCOM You guys should maintain radio silence
up there.

END OF TAPE

ORION (Garble).
CAPCOM Alright, Orion we have the uplinks in and I'm ready to give you the AGS abort constants.
ORION Okay, stand by. Go ahead.
CAPCOM Okay beginning with 224 plus 60529 plus 29402 plus 60406 plus 00572 minus 32664 minus 54401 and we want you to reload 373 with plus 08574 change 254 to plus 08817, over.
ORION Okay, Jim we copy starting with 224 plus 60529 29402 60406 00572 32664 54401 load 373 with plus 08574 254 plus 08817, over.
CAPCOM That's a good read back and, of course, 662 and 673 are minus.
ORION That's affirmative.
CAPCOM Okay, and I have the SEP pad and circ pad if your ready.
ORION Go ahead.
CAPCOM Okay, SEP pad is 10230 all zeros.

END OF TAPE

CAPCOM At 102 30 all 0s and on this circ pad,
ignition 103 21 42 43 NOUN 81 plus 00 69 1 plus all 0s minus
00 435, over.

ORION Okay, hopefully that's a sep pad, TIG of
1032143 plus 00069 correction plus 00691 minus all balls
minus 00435, over.

CAPCOM Roger, that's the circ pad. the other the
first one was the sep pad.

ORION Okay, just a TIG. Okay, we're going to
get to work, start loading this AGS stuff.

CAPCOM Okay, and after you load those AGS support
conscience you'll be clean to pick up on the time line book
at the circ burn.

ORION Roger, after the P-52.

ORION Ask them for a new DAP load or DAP (garble)
it doesn't make any difference.

ORION Why don't you do that, John, while I.

ORION Okay.

ORION I think we're alright but I got to load
this stuff.

ORION Houston, do we have a new LM DAP weight?

CAPCOM Stand by.

CASPER Or is that worth fooling with?

ORION When we PITCH up like this I feel like I'm
going backwards. In a (garble) burn inertia pull.

CASPER Got to have (garble)

CAPCOM Orion, this is Houston, we'd like you to
open AC bus A taperecorder on panel 11.

ORION Okay, it's going open.

CAPCOM And I have a PIPA bias

ORION Okay, it's open.

CAPCOM when you're ready to copy.

ORION Stand by. Man, go ahead.

CAPCOM Okay, address 1456 data 03141, over.

ORION Okay, 156 mag U and the data.

CAPCOM 03141, over.

ORION Roger, 1456 address 03141.

CAPCOM Good readback.

ORION We're entering that now. (garble)901 9 enter
14569 enter load 0314 -- 03141. That number I guess. Meanwhile
(garble)

CAPCOM Orion, this is Houston, we'd like you to
open the update link circuit breaker on panel 11 and go to
normal voice configuration.

ORION Rog. update link

END OF TAPE

ORION Okay, Houston, Orion. How do you read normal voice, over.
CAPCOM Very good. Much better, Charlie.
ORION Okay.
ORION Can you say something about our trajectory now? Are we still 17 000 feet south, the same as before.
CAPCOM Standby, John, we'll have some words for you.
ORION Okay.
ORION And I assume you want to use both systems for PDI, both RGN's.
CAPCOM We're still talking about that down here, John.
ORION Okay.
CAPCOM Orion, this is Houston. At the present time it looks like you will be coming in 16 000 feet high and about 20 000 feet south.
ORION Okay, understand. 16 000 high and 20 000 south.
CAPCOM Roger.
ORION Jim, Johnnie and I just laughing, we'd like to go back to the SIMS, please..
CAPCOM So would we.
ORION Glad you turned the biomed off.
ORION Houston, okay to do that P52 now?
ORION Houston, are we clear to do the P52 now?
CAPCOM Roger, as soon as you're in darkness. John was just - advisory, option 1.
ORION Understand. Option 1 and we're going to gyro torque it.
CAPCOM Roger.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/20/72 CST 18:30 GET 102:36 361/1

ORION Jim, we had P52 we've got you on the
aft OMNI, now.
CAPCOM Roger, we copy.
ORION That one you read about was pretty close
to the old one just a couple of degrees, right?
CAPCOM That's affirmative.
ORION Man, when those jets turn on Jim, nobody
had ever commented before but it really horses this old thing
around.
CAPCOM Roger.
CAPCOM Okay, Orion this is Houston. We have
another procedure we wanted you to try with the comm problem.
ORION Go ahead.
CAPCOM Okay, we want you to open the secondary
power amps circuit breaker on panel 11 and, of course, you'll
loose comm when you open that and then after one minute close
it and then we'll reestablish comm.
ORION Roger, copy. We'll do that after John
finishes marking.
CAPCOM Okay.

END OF TAPE

354 1, 2
294/1

APOLLO 16 MISSION COMMENTARY 4/20/72 CST 18:35 GET 102:41 362/1

CAPCOM Orion, this is Houston. How do you read me?
ORION Loud and clear.
CAPCOM You're loud and clear to.
CAPCOM Roger, could you give us your NOUN 93's
we had lost data at that point?
ORION Yes, sorry about that Jim. Here they are:
the star angle difference was 4 balls 1 minus 4 balls 1, the
torquing angles were minus .067 plus .198 plus .050 torque
at 104 42 25.
CAPCOM Roger, copy NOUN 93 is minus 0.067 plus
.108 plus .050 over.
ORION That's affirmative.
ORION Hey, Houston, I don't know where Ken is
at this point when we messed up into our P52. I trust he is
still keeping an eye on us.
CASPER Are you Ken.
CAPCOM (garbled) trust to.
CAPCOM And Orion, this is Houston. A reminder on
the 400 plus 3 and a VERB 47.
ORION Roger, we already did that.
CAPCOM Okay, very good.

END OF TAPE

Handwritten scribbles and marks at the bottom right of the page.

CAPCOM Charlie, this is Houston. Could you put your mike a little closer your volume seems to be a little lower than Johns.

ORION Okay, how's that?

CAPCOM That's better.

ORION Okay, I had one of them up everytime I turned my head I get orange juice.

CAPCOM Roger.

ORION It's delicious, Jim, but it's better in your mouth than floating around the cockpit.

CAPCOM I know what you mean. I wish I had some.

ORION As a matter of fact I've already had an orange shampoo with the helmet on.

CAPCOM I guess that's better than no shampoo.

ORION Yes, I think your right. We were really impressed with that landing site from 10 miles, anyway, it sure looks exactly like the L&A.

CAPCOM Okay, Charlie we're kind of curious about the orange juice problem, did you have a bag failure?

ORION Well, I think it must be the valve. The command module water had a lot of air bubbles in it and, of course, when I put my suit on it sort of compressed everything and everytime my mike comes by and grabs the valve it bends it down just slightly which is enough to cause some to squirt out due to the pressure from the suit. Over.

CAPCOM We copy.

ORION I have the same problem all the time in one g.

ORIONM Yes, 1 g though, you bend over and it's on your visor and you can lick it off.

ORION Casper, Orion transmitting VHFA simplex, how do you read?

CAPCOM Charlie, this is Houston, we're kind of concerned about -

ORION Casper, Orion - -

CAPCOM - how much orange juice might have spilled out. We're concerned about the amount it might have got in the suit loop and its affect on the LIOH canister.

ORION Jim, most of it for some reason floated up under my helmet - I mean my Snoopy hat and I'm pretty sticky around the temples and all and I don't think anything most of it stuck right in my helmet and the suit loop flow is not enough to drive it down into the suit. And I don't feel like I'm wet at all down in that area. Over.

CAPCOM Okay, thank you, Charlie.

ORION Yes, I don't think there is any of it in the suit loop to amount to anything. Looking at Charlie I can tell where most of it is.

ORION Yes, Ken I was just seeing how you read

APOLLO 16 MISSION COMMENTARY 4/20/72 CST 1840 GET 10246 MC363/2

ORION we're all set to go for your CIRC. Okay,
what kind of sep maneuver did you do? Alright thank you.
CAPCOM Orion, let's try biomed left.

END OF TAPE

CAPCOM --biomed left.

ORION Okay, you got Johns arrhythmia.

CAPCOM Roger.

ORION Houston, Orion, I'd like to confirm that in system A we have enough ullage volume to get all the propellents out of the tank. Over.

CAPCOM That's not correct, Charlie, we'll give you the exact number in here shortly.

ORION Okay, we're still looking at 2000 by 21 circs PSI on the helium.

CAPCOM Orion, this is Houston, in answer to your question, Charlie, if you were to lose source pressure right now you could get 35% out.

ORION Okay, we only have 50% remaining.

CAPCOM Understand. And at 35% is enough to complete the mission.

ORION Okay, do we have a double failure here on the 2 REGs and that loop?

CAPCOM That's affirmative.

ORION Okay, so what's holding us is that check valve that unseats at 2, about 225 and reseats at 212?

CAPCOM That's correct, Charlie, and really you should have about 60% in that system. Your gauge has an error.

ORION We cop--Rog we copy.

END OF TAPE

ORION Houston, Orion.

CAPCOM Go ahead, Orion.

ORION Right, Jim, we watched Ken's waste water dump and I can see why that thing really gives FIDO fits, it really comes out of there like a water hose.

CAPCOM Okay, we copy.

ORION And we took a picture of it or two and I hope they come out to show you that, we had pretty good lighting.

CAPCOM Good, we hope you have some good pictures of it, and we're showing about 2 minutes and a half to LOS.

ORION Rog, AOS time please.

CAPCOM Stand by.

END OF TAPE

ORION good lighting.
CAPCOM Good, we hope you have good pictures of it, and we're showing about 2 minutes and a half to LOS.

ORION Rog, AOS time please.

CAPCOM Stand by. AOS for rev 16 is 103 51 25.

ORION Roger.

PAO And we've had loss of signal as Apollo 16 spacecrafts Orion and Casper have passed behind the Moon. Nearing the end of lunar orbit 15, some 47 minutes before spacecraft come around for the 16th revolution and subsequent landing which is now scheduled for ground elapsed time of - actually the ignition for PDI, powered descent initiation will be at 104 17 23 with the landing some 12 minutes later. The powered descent will have a total velocity change of 6 703 feet per second. The crew has been advised that is the crew of Orion that they will be about 16 000 feet high above the normal flight path at the time of powered descent, and some 20 000 feet south of track. However, the lunar module guidance system will guide the spacecraft to take these discrepancies on normal landing. After landing the crew will then have a sleep period prior to beginning the first EVA which at this time is scheduled to begin at 118 hours 30 minutes ground elapsed time or about 10:30 a.m. tomorrow morning central time. The decision on whether or not the EVAs will be their full length a total of 21 hours will be made during the night while the crew is asleep. Such factors as the consumables remaining such as battery power et cetera in the lunar module will have an effect on this decision. To go back and recaptulate, the reasons for the delay in landing as Ken Mattingly on his circularization burn during revolution number 13, he experienced a oscillation in the yaw mode for the service module engine during checkout and it turns out that the secondary serval loop or one of the circuits for the yaw gimbal drive which can be controlled by either the G&N system or the stabilization and control system which is a backup mode apparently had this oscillation in it. Subsequent simulations and tests here and across the country have found that there is no potential structural hazard to the spacecraft even if it were necessary to go to the mode where there might be some chatter oscillation in the yaw gimbal. Gimbal is the yoke on which the engine is mounted one for pitch and one for yaw and the thrust vector control system in effect acts as a tiller for turning the engine much as you would use a handle on an outboard motor to direct the thrust of the propeller; the thrust vector control aligns the engine through the center

APOLLO 16 MISSION COMMENTARY 4/20/72 18:56 CST 103:02 GET 366/2

PAO of gravity of the spacecraft. At 103
09 into the mission of Apollo 16 this is Apollo Control.

END OF TAPE

PAO This is Apollo Control, 103 hours 49 minutes ground elapsed time. Less than 2 minutes before Apollo 16 spacecraft Orion and Casper, come around on the 16th revolution. Some 27 minutes away from ignition for the power descent and subsequent landing which should take place around 8:23 P.M. central standard time. Ignition for the descent to the lunar surface is now programmed for a ground elapsed time of 104:17 23 seconds. As Casper comes around the corner it should have circularized its orbit around the Moon with the burn maneuver for circularization having taken place at 103:22 ground elapsed time, some half hour ago while the spacecraft was behind the Moon. The lunar module Orion weighing some 18 tons now will weigh half that amount at touch down, some 9 tons, all of this weight loss is propellant that will be consumed by the descent engine. Here in the control center all of the scribbling plotters in the center display panel in the front of the room have been changed around from lunar orbit tracking chart to show the -- we have CSM AOS as confirmed by the network controller. We'll come up live now with the air to ground circuit to monitor the next hour and half front side pass on REV 16 and hopefully a successful landing.

ORION Hello, Houston --

CAPCOM Orion is--

ORION 16 here. Loud and clear, Jim.

CAPCOM Okay, I have a couple of --

ORION Okay, Jim I--

CAPCOM on panel 12 where you get the function to range and on panel 11 update a link circuit breaker closed.

ORION Update a link is closed, switch to range.

CAPCOM Roger. And I'm standing by for your report.

ORION And, Jim, okay, we got the ascent bats on at 123:42. The ED bats are go at 37 volts.

CAPCOM Roger, copy. The ascent bats 103:42 and ED bats are good. And I have a PDI --

ORION And we were on averter 2 for awhile.

CAPCOM Copied, you were on averter 2.

ORION Go ahead.

ORION Go ahead.

CAPCOM Okay, --

ORION Just for a little while.

CAPCOM India 104 17 24 66, data 231 plus 56 990 Over.

ORION Copy, 10417 2466 plus 56 990, for 231.

CAPCOM Good readback.

END OF TAPE

ORION Okay was that 56991 or 0, Jim?
CAPCOM 56990
ORION Okay.
ORION Do we have an uplink, Jim?
CAPCOM Roger, if - you have P00 if you go to
DATA we'll send you some uplinks.
ORION Okay you have it, P00 and DATA.
CAPCOM Okay, they're on their way.
CAPCOM And Orion, this is Houston with a few
words for you on RCS ignition.
ORION Okay, go ahead.
CAPCOM Roger, John, you can anticipate a slight
roll trans at the end of ignition because of CG position
and on the RCS of course, we want normal configuration and
your RCS quantity system A is OFF because of the high
pressure in that system it's off by about 13 percent.
ORION Okay.
CAPCOM - 13 percent more than indicated.
ORION Understand.
CAPCOM Orion do you have a VERB 33 on the DSKY?
ORION That's affirmative.
CAPCOM Okay. Let's do an enter on that.
CAPCOM We've lost high bit rate we have -
ORION VERB 33 entered.
CAPCOM We have one more uplink to send.
ORION Okay. (noise)
CAPCOM Orion, will you turn the function switch
OFF?
ORION Function is off. Which one, Jim?
CAPCOM That's the S-band functions.
ORION All of then?
CAPCOM Negative, the one, the ranging switch.
ORION Okay, its going off.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/20/72 CST 19:54 GET 104:00 369/1

CAPCOM Orion, this is Houston. We want batteries
to read OFF now.
ORION Roger.
CAPCOM Roger. Put a little more load on the
ascent Bats.
ORI Right battery 3 is OFF.
CAPCOM Roger.
ORION Jim, could we YAW right a little bit and
point that OMNI right at you, would that help?
CAPCOM Standby.
ORION Hey, any word on the uplink, Jim?
CAPCOM Why don't you put in that YAW maneuver.
YAW right 20 degrees, that might help.
ORION Roger.
ORION Here's YAW right 20.
CAPCOM Roger.
ORION Jim, how about reading that up to me and
I'll copy it down.
CAPCOM Looks like we're getting good data now
Charlie, standby.
CAPCOM We're uplinking now.
ORION Okay, Jim, I think we'll start the - John
says we'll start the PDI from zero YAW since the OMNI is pointing
right at you. That be better for you?
CAPCOM Standby.
CAPCOM Okay, Orion, we're finished with your com-
puter.
ORION Okay.
CAPCOM Okay, Orion, this is Houston. That zero
YAW looks okay.
ORION Alright, fine, thank you.

END OF TAPE

ORION Call P63, John. How do you read us now, Jim.

CAPCOM Loud and clear.

ORION Read loud and clear on vox, okay?

CAPCOM Yes, sir, John, you're loud and clear.

ORION Ten minutes.

ORION Okay, let's check the DPS configuration card. CB 11 DECA gimbal A/C closed (garble) closed index 5 closed. CB 16 displays and override logic closed. SCS (garble) step control all closed except the AEA.

ORION All closed except the AEA.

ORION Okay 25 degrees a second.

ORION 25 degrees a second.

ORION (garble) control auto commander.

ORION Auto commander.

ORION (garble) translation of 4 jets.

ORION 4 jets valve couple on engine gimbal enabled descent command override off.

ORION Off, go.

ORION Fourth stage reset Deadband and attitude control 3 to mode control PNGS AGS auto.

ORION Go. Okay. On highball landing radar computer mark in the PGN PNG's guidance AGS mode select Altitude altitude rate. Impression 1220 ambient pressure 39.

CAPCOM Orion you can configure for normal RCS configuration now.

ORION Okay, system A is on.

CAPCOM Roger.

ORION Hey, Jim we got RCS A reg light when that went on, pressures are good though.

CAPCOM Roger.

ORION Okay, John, the DET is set okay FDAI verified FDAI 011, trim it up a little bit. VERB 40 NOUN 20, please.

ORION Got it Charlie. (garble)

ORION AGS and PGNS are aligned at the zero. 410 400 plus 1 going in. And the needles to (garble) 433.

PAO This is Apollo Control. While the crew of Orion is going through their predescent checklist a word on the command and service module, Casper. The circularization burn was on time. The current orbit is 53.1 by 67.8 nautical miles. Back to Orion.

ORION Okay, we are cleared down to 5 minutes At 5 minutes, we close the landing radar breaker. Right. (garbled sentence) second trans mission also cuts in and out. The old Earth is sure pretty.

APOLLO 16 MISSION COMMENTARY 4/20/72 20:00 CST 104:06 GET 370/2

CAPCOM
ORION

Orion bring battery 3 on at minus 5.
Roger, copy.

END OF TAPE

ORION Roger, copy.
PAO This is Apollo control. During the descent phase all the way to touch down the lunar module pilot will be reading off numbers out of the computer. Three sets of numbers actually one the angle at which the commander should look through the grid on his window toward the landing site. The other numbers have to do with the vertical velocity or descent rate and horizontal rates these are all coming out of the computer he reads them to the commander back to Orion.
ORION .82.
CAPCOM Say again the reading on the velocity ...
ORION Adaptive transmitter. 3.8.
CAPCOM Roger, copy 3.4 and 3.8.
ORION Correct.
PAO Flight director Jerry Griffin taking a final status of all the positions here in the control center for a go for PDI.
CAPCOM Orion, your go for PDI.
ORION Roger, go for PDI. And go for final trim -
ORION No.
ORION Looks better than it did.
ORION Go ahead and enter.
ORION Enter
ORION Go, watch is set and wound.
ORION She checks.
ORION About a second off here.
ORION Okay, stand by for 2 minutes, John.
ORION Roger.
ORION Okay, good.
ORION Target about 10 miles it looks like.
ORION Excellent. Okay, 2 minutes master arm on.
ORION Master arms on, two lights, Houston.
CAPCOM Roger, copy 2 lights.
ORION PGNCS in mode select, 367 is in. Next thing is at 30 seconds, John. Turn the page.
ORION Hey, Jim you want us to turn the ranging back on?
CAPCOM Negative.
ORION Okay, we're in voice backup.
CAPCOM Roger.
ORION 50 seconds.
ORION Okay at 30 we had engine arm then we -
30 second engine arm goes to descent, then we ullage burn.

END OF TAPE

ORION 50 seconds.
ORION Okay, at 30, we had engine arm, then we --
30 seconds engine arm goes to descent then we ullage,
PRO 5-okay, it's in arm descent --
ORION Arm is descent altitude light velocity
light.
ORION No ullage plus X.
ORION Upon ignition you start push button if
we get ullage.
ORION Ullage?
ORION Auto ullage.
ORION BRAVO.
ORION Okay. If it starts.
ORION It's started
ORION It says command over-light is on.
ORION Put your throttle in min.
CAPCOM Roger, we copy.
ORION All right. Descent Engine command over
ride master arm off.
ORION Master arm is coming off.
CASPER Standby for throttle up, thrust to
weight is okay.
ORION 22, 23, 24, 25, 26, throttle up
ORION On time!
ORION Feel that beauty come on!
CAPCOM Roger, we copy.
ORION The thrust to weight is good --
66 000 feet -- they were right on!
ORION You're looking at a minute.
ORION Say, Jim, at pitch over do you want me
to go APS OMNI or stay forward?
CAPCOM Stay forward and you've got to go at one.
ORION Roger.
ORION Hey, we're way high, John, we got to get
down. Way high on the H dot.
ORION All right, all right, just a minute
Charlie. Down to 45 already.
ORION Does it look good? Passing 1:30.
CAPCOM Okay, Orion, I have a 169 (garble).
ORION Double H dot almost --
ORION Go ahead.
CAPCOM Plus 00 800.
ORION Plus 00 800. 100 feet
CAPCOM and you go
CAPCOM Excuse me John.
ORION Okay that's centered. Dead centered
ORION Passing 2 minutes
PAO Some 180 miles to go to the landing site.
ORION You yaw out here at 3.
ORION I can take that out when we get it
(garble).
ORION Hey, the PGNCs is tracking right on Jim.
CAPCOM Roger.

ORION within at a 10th of a foot a second
CAPCOM Roger.
ORION It's three minutes, propellants --
ORION Pressures are holding good in the DPS
ORION All oxidizer pressures look good.
CAPCOM Orion you're go at 3.
ORION Roger, go at 3.
PAO One hundred thirty five miles down range.
ORION Roger, we copy.
ORION And there's still 37 volts, Jim.
CAPCOM Roger, we copy.
ORION Velocity lights out, Charlie.
ORION -- on transmitter, probably --
ORION We got a --
ORION Watch it now
ORION (garble)
ORION What now, Charlie?
ORION I said, there's no way to get the altitude
light at this time.
CAPCOM Orion, you go at 4.
ORION We're 50 000.
ORION Look at that altitude and velocity lights
are out at 50 K.
ORION Isn't that amazing?
ORION Copy that Houston?
CAPCOM We copy.
ORION Look at that data, Houston.
PAO Ninety miles to go.
ORION You won't ACCEPT it?
CAPCOM Okay, you have a go to ACCEPT.
PAO Horizontal velocity 3200 feet per second.
ORION Hey, it's in.
CAPCOM Roger.
PAO Descending at a 112 feet per second.
ORION AGS and PGNCS will be getting off a
little bit in altitude now. Update.
ORION At 5 minutes. Coming in like gangbusters.
CAPCOM Rog, and you're go at 5.
ORION Roger.
ORION 39 000 -- hey, look at that 136 feet
difference now. (garble)
CAPCOM AGS tracking about a thousand high.
ORION Roger, you get there.
ORION Six minutes, we should be at 32 000 --
ORION It's not back on profile but almost.
CAPCOM John, you're go at 6.
ORION Forty-five percent right on, Roger.
Right on.
PAO Thirty-nine miles to go.

PAO Passing through 33 000 feet.
 ORION It is 6 30, it should be at 30 000, mark it,
 32 000, 6 30, okay, looking good, John.
 ORION That angles getting down there.
 CAPCOM Throttle down 7.3
 ORION Understand 7.3.
 CAP Roger.
 ORION (garble) mark it.
 CAPCOM (garble)
 ORION Seven minutes, (garble) go 104 down 28 000
 still about a thousand high, it looks like.
 ORION It's starting to look pretty good..
 ORION Down 223, setting up ready, the AGS
 ready at 14 K, then I do a 360 and then turn the camera on
 Breaker is in. Throttle down.
 ORION On time
 PAO Sixteen miles to go.
 ORION Jim?
 CAPCOM Loud and clear.
 ORION Do a clip in a little bit, John..
 ORION Okay.
 ORION Twenty-one thousand coming up on
 8 minutes.
 CAPCOM Roger, you're go at 8
 ORION I can see the landing site from here,
 Charlie.
 CASPER Go at 8, John's got a visual.
 CAPCOM We copy.
 ORION One-hundred and thirty -- we're right
 on, John.
 ORION What?
 ORION Right back on profile.
 ORION How does it look to you?
 ORION -- right in there.
 ORION Okay, standing by to update the
 AGS.
 ORION Had a little roll steering here.
 CAPCOM Monitor descent one.
 ORION Roger, descent one.
 ORION Hey, Jim, we got about a 3 degree roll
 command in.
 CAPCOM Roger.
 ORION -- enter 360 minus 01 72 Denter 367 is
 coming up, and I'm starting the clock, I mean the camera.
 CAPCOM Go at 9.
 ORION Ehey, we're under 12 000, John. Go at
 9 coming down at a 182, a little steep, hey we're going to
 be right on it, just about right on, maybe 10 feet --
 10 000 feet stand by. 64 at 8200 PRO --
 ORION Pitch over --
 ORION Pitch over -- hey, there it is --
 Gator, Lone star right on.

APOLLO 16 MISSION COMMENTARY 4/20/72 104:16 GET 20:10 CST 372/4
ORION Call me the PGNCS, Charlie.
ORION Okay. 38 degrees, Palmetto in sight,
North Ray, looks like we're going to be able to make it
John, there's not too many blocks up there.
CAPCOM Rog, you're go for landing.
ORION Okay, 4000 feet, 42 LPD, 3900 feet.
ORION Two to the south, Charlie.
ORION Okay, it's in. 41 LPD 30 000 feet on
profile.
ORION And w're coming right down -- it's going
to be a little fast.
ORION It looks 41 LPD 2000 feet 60 on profile.
ORION Okay..
ORION Forty-two LPD, couple more in, 1400 feet
44 now looking good. Out of a 1000 feet -- right on pro-
file, 54 LPD dropping out the bottom now, 800 feet 30 down.
ORION Okay, Houston, we're going to be just
a little long, --
CAPCOM Roger.
ORION -- but we're just now a beam of Double
Spot.
CAPCOM Copy.
ORION Twenty-three, 22 down at 500 feet.
ORION Okay.
ORION The big blocks over here to the left,
John. Okay, 300 feet, 15 down.
ORION Okay, okay take over Charlie.
ORION Okay. Okay, fuel is good -- 10%, there
comes the shadow. Okay 200 feet, 11 down, give me a couple
of clicks up, 5 down at 130 feet, two forward, no more drifting
looking good. Perfect place over here, John, a couple of
big boulders -- not too bad, okay 80 feet down at 3 --
looking super. There's dust okay down at 3, 50 feet, down
at 4, give me one quick up backing up slightly, okay 2 down
standby for contact, come on let her down, level off, let
her on down, okay step 6% plenty fast, contact, stop, BOOM
PROBE Engine Arm. Wow! Wild Man look at that. Okay 413 - -
ORION Well, we don't have to walk far to pick up
rocks, we're in front of them, open, close, open, close.
ORION Old Orion has finally hit it, Houston,
FANTASTIC!
ORION (garble) I can look right out to the
left and see (garble) --

END OF TAPE

ORION Orion is finally here, Houston. Fantastic!
I can look right out to the left and see (garbled) and we're
about --

CAPCOM You're left OMNI, you're right?

ORION Okay, you got it. Hey, we're forward to the
north of - forward and to north of Double Spot I guess about 200
meters to the north and maybe 150 meters to the west. Not flat
lands, though, Houston.

CAPCOM Roger, I copy 200 meters north and about 150
meters west.

ORION Man, I can see all the way to the ground
just like flying the LTV, piece of cake.

CAPCOM Thats good.

ORION Ascent Pressures look good.

ORION Okay, ascent helium monitor, cycle, I did.
02 ascent sleepy. Fantastic! Perfect precision is plane
and one on the plains of Descartes.

CAPCOM Well.

ORION Hammerstock I better go easy on this land to
radar circuit breaker, huh?

DUKE Yeah, don't - okay that's the right one.
The camera's off.
Hey, it sure ain't flat, John. There's
that ridge to the north.

YOUNG Yep, sure is.

DUKE All we got to do is jump out the hatch and
we got plenty of rocks.

YOUNG Houston --

DUKE Boy, it sure looks like you could make -
let's see, Crown Crater from here; I can see Ray Crater from here.
Got it. Boy! I almost had apoplexy, that program alarm and that's
your radar breaker.

YOUNG Charlie's about had - Charlie's got nothing
but a ridge to look at.

CAPCOM Sounds beautiful, John. Wish I were there.

DUKE There's a ridge out in front of us to, John.
Yeah, there's a ridge in front of us, one to the side of us and
my guess is we're in a subdued old crater that's got a lot more
craters.

CAPCOM Roger, we Copy.

DUKE What a neat place!

DUKE Say, Jim, this ridge in front of us does
look like a subdued crater and it may be the raised rim about
50 meters in front of us, about oh - 4 or 5 meters tall. That's
30 or 40 percent of the surface is covered with boulders that
are maybe half a meter in size. Out in front of us and to the
right, where we landed -

YOUNG Wait a minute, Charlie.

DUKE We gonna stay, Houston?

CAPCOM Standby.

CAPCOM Everything's looking okay up to this point, John. We'll give you a final word here shortly.

DUKE Hey, we were coming down pretty good until I hit the stop button, and then it fell out.

YOUNG No, the engine stopped.

CAPCOM I know exactly what you mean.

YOUNG It's really nice to have your shadow out there, every little bit helps. It's a good altitude to look out.

YOUNG Now, that was super.

YOUNG Makes us (garbled) batteries all looking good, EPS's looking good ascent quantities are looking --

DUKE The way these rocks are laid in here out my window, I guess they come from South Ray.

YOUNG There's some biggies out there. We've got right out in front of us about 100 meters, at my 10:30 position. I've got one that must be 3 meters across.

CAPCOM Orion, you're stay for T one.

YOUNG Understand. Okay, stay for T one.

DUKE P68 John, and I'll get the AGS going.

YOUNG 414 plus 2, then 400 4.

DUKE Hey, Jim, my hat's off and a case of beer to FIDO. I'll tell you that target was just beautiful. Boy! you guys just burned us right in there.

YOUNG That was the superb.

END OF TAPE

ORION That was superb.
 CAPCOM Very good.
 ORION Where it says we are, I believe it.
 ORION Hey, Jim, our NOUN 43s are minus 896 --
 CAPCOM We have them, Charlie.
 ORION plus 15 52. Engine stop reset?
 ORION Engine stop reset. Hey pro, pro P-12.
 go on in there chip. Okay take time for T-2 is 10 104, plus
 42 plus 16 64, Pro. Those numbers are good,
 ORION Those numbers are good.
 ORION Yeah. Auto, auto, pro, okay, PNGCS
 mode control NOUN 33, you got. 6 minutes, we're counting down.
 ORION Boy, this is really a nice place.
 ORION Try that 1/6 G, Charlie.
 ORION My restrain harness has just got me anchored
 ORION Oh, that's what the trouble is.
 ORION Okay, AGS are set, 410, standing by. Man,
 that was a sup. It's about level, we're not going to have a bit
 of trouble getting out--
 ORION Yeah, it's going to be neat --
 ORION It sure is not -- it's not smooth -- it's
 not that FS smooth,
 CAPCOM Say again, John.
 ORION It's not that FS smooth, we're in the
 middle of a block field
 CAPCOM Roger.
 ORION There's Crown crater up there.
 ORION It did a little block. We may have
 squashed a few.
 ORION And, Jim, we got Crown crater out, John's
 left window about 9:00.
 CAPCOM Roger.
 ORION And just looking at it from here, I don't
 think the Rover's going to have any trouble going up that
 hill.
 CAPCOM Glad to hear that.
 ORION I Could be wrong. Slopes tend to fool you.
 ORION It looked good going North Ray, too. There
 were a some big blocks on the rim but (garble) tracks it looked
 good. It looked good.
 ORION Gamma ray. Turn on the water for a
 second, Charlie.
 ORION Okay, that's a good idea. That shadow
 is not as long as I thought it was going to be. It looks
 like we're right on top of the ground.
 ORION Yeah, we didn't--it's not very far. Man
 we got a lot of rocks, that's for sure. How's it looking
 Jim.
 CAPCOM It's still looking good, we're just
 standing by here.

ORION I wish I could tell you what kind of rock--
I wish I could tell you what kind of rocks those are, Houston.
But some of them are very white and dog gone if I can see, I'm
not close enough to them but and I see one white one with some
black, can't tell whether that's dirt or not.

END OF TAPE

SC and doggone if I can see, I'm not close enough to them but - and I see one white one with some black - can't tell whether that's dirt or not on it, but it could be a white breccia, (garble) such a thing.

CAPCOM We copy.

SPEAKER Everyone of them are angular too, Joe, and they're all angular, they're (garble) gray, I believe. There's a pretty one over there, without any dust on it at all. At about 50 m----, by those 3 little craters - in fact, Houston, when I told you that I thought this terrain might be very spectacular, boy I was just kidding, it really is something looking at that mountain. That is a big mountain Charlie.

DUKE Yes, we're within 2 minutes, John. I agree with you, it is really -

DUKE Thats got to be that big bright stuff.

CAPCOM Orion, you're stay for T2.

ORION Right, super. Thank you. Stay for T2.

DUKE Let's go to Foo, and then ICS PTT.

CAPCOM Okay, Charlie, when you get the surface checklist, I have some changes that we want to take care of.

DUKE Stand by, there probably are a few, aren't there?

CAPCOM Yes, there are a few and we'll have a few more in order to conserve power to give you maximum stay time.

DUKE I'm (garlbe)

DUKE That one big G is a lot nicer when you take the restraint harness off.

YOUNG Houston, are we go for DPS vent?

CAPCOM That's affirmative, go ahead.

SC Okay Houston, master arm's on 2 lights.

CAPCOM Roger.

SC Descent vents (garble)

SC Descent vents far.

CAPCOM Roger.

PAO This is Apollo Control, unofficial touch-down time 1042936 ground elapsed time.

SC Okay, go ahead.

CAPCOM Close descent reg 1.

SC Descent reg 1 closed.

CAPCOM Charlie, did you say you were ready to copy the changes?

DUKE Yes sir, go ahead.

CAPCOM Okay, on 1-2 in the right column there about half way down the S-band, pitch and yaw set, you can scratch that and the business about peak, in other words we're going to stay with the OMNI. Over.

DUKE Okay, I copy.

CAPCOM Okay, the next change is on 1-3 down at the bottom of the page on the battery reconfiguration. Instead of battery 2 off, we want battery 3 off reset. Next line down, battery L should be CDR instead of LMD and of course the talkback should be CDR after that. Next line down should be battery 4 off reset. Over.

DUKE Okay, we copy all that, BAT 3 off reset, BAT loony to commander, talkback commander, BAT 4 off reset. Over.

CAPCOM Okay, then the next page on circuit breakers 1-4.

END OF TAPE

SC - reset. Over.

CAPCOM Okay, then the next page is on circuit breakers 1-4. The first change is on the first row there, on Panel 11, S-Band antenna. The third one down there from the left should be open. And then on the second row, when - Mission Timer on the second row should be open. Then drop down to the fourth row - LGC DSKY should be open.

SC Okay, copy. S-Band antenna open, first row. Second row, Mission Timer open. Third row - fourth - nothing. Fourth row, LGC DSKY open.

CAPCOM That's correct.

CAPCOM Okay. Next page, 1-5.

SC Is that everything?

CAPCOM No, I've got one - a couple more, probably. Okay, on 1-5 on the fourth row, Panel 16, Inverter 2 open. Over.

SC Okay. Inverter 2 open. We got Inverter 2 powering the AC right now.

CAPCOM Okay. Well, part of our power-saving program is to not have the AC powered up on the surface.

SC Okay. That's fine.

CAPCOM And the next change -

SC Somebody's got -

CAPCOM And the last change is on Page 1-7 on the right column there, about 4 lines down, we want Inverter - Instead of Inverter 2, we want Inverter Off. Over.

SC Okay. We copy Inverter Off.

CAPCOM And then, the last change is on 1-8 in the left column. We want Track Mode Off and S-Band should be to best OMNI, which I believe is the one you have selected right now.

SC Okay, we've got Track Mode Off and S-Band to best OMNI.

CAPCOM And that's the end of the changes up to that point.

SC Okay, Jim, are we going to press on with the first rev checklist?

CAPCOM Yes, go ahead. And be advised that your stars should be good as published.

SC That sounds pretty good.

CAPCOM Okay, Orion. I have some more changes to that surface checklist whenever it's convenient for -

END OF TAPE

CAPCOM Okay, Orion, I have some more changes in that surface checklist whenever it's convenient for someone to copy.

PAO This is Apollo Control and Orion is safely on the ground at Descartes. Having landed at 104:29:36 ground elapsed time. In local time that's 8:23 P.M. time of landing, not to far away from the planned landing point. After the crew has a chance to power down the lunar module, do some housekeeping they will have a sleep period which will begin at about 107 hours, about 2 hours and 10 minutes from now. With EVA 1 starting tomorrow morning at about 10:30 A.M. central standard time. This is Apollo Control at 104:51.

CAPCOM Fellows to sleep first.

DUKE That suits us. You probably gathered we'd like to.

CAPCOM So would we.

DUKE Yeah, it's been a hard days night for you to.

CAPCOM You deserve a good sleep

DUKE Jim, I feel exactly like I thought I would. I really want to get out but I think that this discretion is the better part of the valor here.

CAPCOM Good. Glad you - - glad you think that.

DUKE Man, it's really tempting though, it really looks nice out there.

DUKE Okay, Jim, if you did get 'um my 047 on the axis plus 37566 053 with minus 73667.

CAPCOM Give me those values again Charley, I didn't copy them.

DUKE Plus 37566 minus 73667.

CAPCOM Rog. I copy.

CAPCOM Okay. Orion, we're ready to terminate the vent on the oxide.

DUKE Okay. Going closed. Ox vent barber pole.

CAPCOM Roger.

END OF TAPE

SPEAKER Jim, would you like to -- guys like to take one amp worth of power and let me see if I can get this steerable going, that landing might have knocked something loose.

CAPCOM Standby.

SC Cracked Charlie's fillings, we know that. After you fly with Navy pilots for 3 years, you know what the feeling is.

CAPCOM Yes, I know it exactly. I think we'd like for you to try to get the steerable up, if you can.

SC Alright, we'll do that. Okay Jim, it didn't work. I was looking at the shadow and the pitch goes around nicely. You can watch it move -- it oscillates quite a bit before it damps but the yaw, I can't get to move at all, so I guess it's belly up.

CAPCOM Okay, and we assume you got all the necessary circuit breakers in AC and DC.

SC Rog. I put the AC bus S-band in and I put the S-band comm in and the pitch moves fine but the yaw does not move.

CAPCOM Okay. We copy.

SC I'm going to power it back down.

CAPCOM Okay and Charlie when you get a chance if you're free, I can give you the rest of the changes coming up here in the next few hours.

SC Okay, John is marking on (garble) here and go ahead, I copy.

CAPCOM Okay, I don't want you to you know introduce any light there that might hurt John but the first change and -- we're recommending perhaps you want to tear out a blank sheet of paper there so you can write down the sequences and the page number of these things so you won't be confused.

SC It just so happens that the back of the data card book is blank. Go ahead.

CAPCOM Okay, sequence number one is on page 1-9 --

END OF TAPE

SC It just so happens the back of the data card book is blank. Go ahead.

CAPCOM Okay, sequence number 1 is on page 1-9 and that's configure CAM for stay and that should occur about 105:10 and if you look at page 1-9, if you have it handy. Over.

SC Standby. Okay, I got it.

CAPCOM Okay, you're aware that you won't have your mission timer so we're going to have to keep you on time in here. At -- you see the eat period there on the right column -- we want to skip that until you all get your suits off. And we -- the next sequence is number 2 of course, and that's on page 2-1 and you can turn to that page and that should occur at about 105:38. And we'll keep you on time and at the -- so that's cabin prep for EVA, just to get things stowed properly and then at the bottom of 2-1 go to page 3-4. Over.

SC Okay, copy 2-1, then finish that page and go to the 2 3-4.

CAPCOM That's right and then of course sequence 3 is on page 3-4 and that's doff suits. And that doff suit should occur at about 105:58 and at that point you all be in a position there where you can eat and we can brief you on the rest of the surface plan. Over.

SC Rog. That sounds super Jim. We'll press on with that -- those changes and in this briefing, we'd like a word about our lunar stay looks like and etcetera. Sure you all can get all that?

CAPCOM Okay, we understand.

SS For some reason, it's remarkable but once you sit down up here the calm just clears up beautifully.

CAPCOM Very good. Okay, let's terminate the fuel vent Orion.

SC Fuel vent's (garble)

CAPCOM Roger.

SC Okay Houston, you want a target?

CAPCOM Standby. Roger, go ahead and torque Orion. They look real good.

SC (garble)

CAPCOM Okay.

SC Boy these are really neat optics. The Earth is in the window and I'm looking right at the star, that's really good.

CAPCOM Orion this is Houston, I have some torquing angles for you for the IMU.

SC Roger, go.

CAPCOM Okay, X is 286.25, Y is all zeroes, Z is 087.57. Over.

SC 286.25 all balls 087.57.

CAPCOM That's a good read back.

SC Okay Jim, my 544 is 5 through 546. 544 changed quite a bit. It's minus now .116. 545 is plus 052. 546 is minus .068. That was after the CAL. Before the CAL they were plus 006 and plus 045 minus 088. Over.

CAPCOM Roger, I have them Charlie.

SC And I guess we're ready for the E-MEMORY dump.

CAPCOM Standby.

SC Say when, Houston.

CAPCOM Okay, we're ready for the E-MEMORY dump.

END OF TAPE

CAPCOM Stand by.
SC Say when, Houston.
CAPCOM Okay. We're ready for the E Memory dump.
SC It's on its way.
CAPCOM Roger.
SC And Jim, that AGS on lunar align for
a couple of minutes there put me within about less than
1/2 a degree from the PGNCS.
CAPCOM Roger. We copy.
CAPCOM Orion, you're stay for T-3.
SC Roger. Stay for T-3.
PAO This is Apollo Control. 105 hours
6 minutes -
SC - power down.
CAPCOM Okay, I copy.
PAO We've had loss of signal from the
Command Module, Casper, as it went behind the Moon. During
that frontside pass, the Command Module Pilot Ken Mattingly
was passed some flight plan updates for the Orbital Science
Phase on the Mission. Orion, meanwhile, at Descartes land-
ing site, is going through the post landing checklist, all
the power-down procedures to conserve electrical power, and
we're still up and live at 105:06.
SC You really want to do this, don't you,
Houston?
CAPCOM Go ahead, Orion. Orion, this is
Houston. Say again.
SC It works.
CAPCOM What was that, John? What worked?
SC It goes right into gimbal lock.
CAPCOM Okay. Good show.
SC Yeah, I thought you'd like that.
That's a sad feeling just to watch that thing go over.

END OF TAPE

YOUNG And Jim, the old ED bats are hanging
in there at 37 each.

CAPCOM Okay. We copy and I have a T17 to T21
when you're ready to copy.

YOUNG Go ahead.

CAPCOM Okay. T17, 106 25 05.65. T18, 108 23 36.87.
T19, 110 plus 22 plus 08.13. T20, 112 plus 20 plus 39.04.
T21, 114 plus 19 plus 10.65. Over.

YOUNG Okay. T17, 106 25 plus 05.65. Then 18, 108 23
36.87. 19 is 110 22 08.13. 20 is 112 20 39.04 21 is 114
add 19 minutes 10.65 seconds.

CAPCOM Good readback.

DUKE Jim, I have a question for you. I'm on
page 1-5. My circuit breaker power down. Row 3, it has us
pushing in the - - leaving the primary S-band in a comm, power
amp and transmitter receiver closed. We have them open right
now. What would you prefer?

CAPCOM Stand by.

CAPCOM Okay. Charley leave those open.

DUKE Uh, Roger. And also the S-band antenna is
open and I'll leave that open. How about the cabin fan control,
do you guys want that one closed?

CAPCOM Stand by.

CAPCOM Orion, go ahead and open that cabin fan
control.

DUKE Roger. It's open.

END OF TAPE

SC Jim, in my 2 o'clock position about right on the rim of that little ridge we described earlier there's a fresh little crater that is about 10 meters across and it - it's just loaded with little 30 - 40 centimeter blocks around it. Over.

CAPCOM Okay, we copy.

SC Looks like you could see these blocks in the walls of that little crater. Looks like the thing is going to be pretty blocky in the regolith.

CAPCOM Roger, we copy.

SC Houston, it really is bright outside. The surface looks almost white to me. Okay, Jim, we're about to power down the AC.

CAPCOM Roger.

SC You want these MESA heaters on high, Houston?

CAPCOM Stand by. Stand by, we're thinking about it. Roger, ORION, keep the MESA heaters on high.

SC MESA heaters on high.

PAO This is Apollo Control at 105 hours 20 minutes. Here in mission control we've completed a shift handover. Flight director, Pete Frank has relieved flight director Jerry Griffin. And we will have a change of shift press briefing in about 15 minutes. This briefing will be held in the main auditorium, Building 1, and that's about 15 minutes from now. The crew aboard ORION on the lunar surface at Descarte at the present time is completing their post landing checklist, getting the lunar module configured so that they can begin a rest period prior to their first extravehicular activity. The original flight plan called for them to begin EVA immediately after landing, however, because of the landing 3 revolutions late, we're approximately 6 hours later than planned. The crew suggested and mission control concurred that it would be wiser to have them try to get some sleep before going out onto the lunar surface. The flight planning is progressing an hour at a time, a page at a time on the flight plan, and a day at a time. Right now, we're planning for the first EVA to be essentially a normal EVA. There has been some discussion of possibly curtailing or deleting EVA 3, however, no decision has been reached on this at the present time.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4-20-72 GET 105:24 CST 21:18 MC-383/1

SC Houston, the checklist says put function from range to range. It's in all 3 sets. How do you want it?
CAPCOM I'm not reading you very well. Something you did has caused a lot of noise down here.

SC We turned the power amp off. (garble)

CAPCOM Okay ORION, you better turn the power amp back on so we can hear you a little better.

SC How do you read now Jim?

CAPCOM Loud and clear Charlie.

SC Okay, we'll leave the power amp on or in secondary. Do you want the function switch to range as checklist calls -- it's in off-reset now.

CAPCOM Standby. Okay ORION, you can go to range on that.

PAO This is Apollo Control at 105 hours 28 minutes. We're about 22 minutes away from reacquiring the Command Module CASPER. The lunar module on the surface is in a stable configuration, everything looks good at this time. We're presently ready to begin the change of shift news briefing in the main auditorium at the Manned Spacecraft Center, Building 1. We'll switch to that at this time.

END OF TAPE

PAO This is Apollo Control at 106 hours 53 minutes. During our change of shift news briefing we've had a pretty steady flow of conversation with the crew. Initially, John Young while they were going through the post landing checklist getting the lunar module figured for their stay. And for the sleep period Young reported that they had a - - an O2 sub-light. This is a light that would indicate some sort of a problem with the water separators and there are two of them on the lunar module. Only one of which is required at any time. These remove moisture from the atmosphere of the LM cabin by centrifuging the moisture out of the air. That's a spinning blade type device that spins the moisture out. And looking at the data we on the ground we able to see the separator had slowed down quite a bit. Infact it almost stopped it rotation. The initial reaction was that perhaps there had been a slug of water in the suit curcuit and this large slug of water had simply bogged the separator down. We had the crew switch to the secondary - - or to the second separator and got the same indication. After going through a bit of trouble shooting, it appeared that perhaps there was a blockage in the system but not - - not water. We didn't have any indication of water in the hoses when the crew a - - upended the suit hoses. Nothing ran out of them. And by going through a series of different configurations, I was determined that the check valve - - cabin check valve was apparently not working properly and by simply changing the position of this valve which is perfectly acceptable we're able to get rid of the problem. You'll hear this situation discussed with the crew and also hear the resolution of the problem. And we see no impact to the mission as a result of this. The LM telling you controller said that we would be able to get by with the situation as it was and it would cause no problem. Now also we've had quite a bit of description of the lunar surface out the window from both Duke and Young. At the present time the crew is preparing to begin their first meal on the lunar surface prior to beginning the sleep period. We'll play back the accumulated tape that we have stacked up, about 35 minutes of it. And then get caught up and continue to follow conversations live.

DUKE Jim. Houston. Over.

SPEAKER (garble)

DUKE Jim. Orion.

CAPCOM Go ahead, Charley.

DUKE Had a long day here. Could we doff the suits before we do the cabin configuration and all?

CAPCOM Okay. That's fine with us Charley. Go ahead.

DUKE Oh, Hello there Tony.

CAPCOM Yeah, that's swell. Yeah, good evening fellows. Outstanding job. Real nice.

DUKE Dan, wait till you see the rocks of this place.

CAPCOM I've been listening to you. Sounds great.

DUKE Tony - -

CAPCOM It's going to be enough to make geophysicist sit up and crow.

DUKE Laughing. You already done that.

ORION You've never seen so many rocks, you never, you never seen so many rocks Tony. Some biggies too.

CAPCOM Uh, really sounds fine. I'm getting green again. I tell you I wasn't green about 3 hours ago.

DUKE I'd say you've earned your pay today. All those guys that (garble) and figured out all that earned their pay today I'll tell you that.

YOUNG Hey, Tony tell John Covington that this thing is a piece of cake compared to his light weight training unit.

CAPCOM Okay. I'll sure do that. He's running around here somewhere.

YOUNG You just see Charley just picked up his 130 pound back pack with one hand. Be advised Tony we changed our mind on doffing suits since we got some stuff behind the ascent we're gonna go through the normal configuration. We're doing the cabin configuration for stay now.

CAPCOM Okay. We carry that

END OF TAPE

ORION - since we got the stuff behind the engine - ascent engine, we're going to go through the normal configuration. We're doing the cabin configuration for stay now.

CAPCOM Okay. We copy that.

ORION Okay, Houston. We're down to getting rid of the arm rest.

ORION By the time we get this junk bag full, I don't if we're going to be able to open the door.

CAPCOM Right. I know what you mean.

ORION Okay, Tony, my passive - my personal dosimeter reads 21109.

CAPCOM Okay. 21109.

ORION When I went through that jettison business, I felt like I was throwing away half the cabin.

ORION Minus 22050, Houston.

CAPCOM Okay. 22050.

ORION Okay, Houston, before we do the ETV part of (garble) the cap prep we are going to take our suits off.

CAPCOM Okay.

ORION If we'd been smart, we'd have taken them off at the first part of this thing.

CAPCOM Before you get your suits off there, you may want to bring that 500 millimeter forward from behind the engine cover there.

ORION Tony, we're ahead of you. We already did that. And, we got everything out from back here, and I'm putting up the ISS now, and we'll be - John's getting his stuff off.

CAPCOM Good show.

ORION Okay, Tony, we've got three of us in here now and John's out of his suit.

CAPCOM And, I assume, all three are walking around.

ORION No, not exactly, one of them is sort of lying there. Tony, are ya'll getting the high bit rate data here now?

CAPCOM Yes, we do Charlie.

ORION Okay. John should be back up here. Okay, I read you, Tony.

CAPCOM Very good, Don.

ORION I guess our opinion of this operation right about here is that the coolant is really marginal in the suits, and we'd like to get permission to get a shot of cold water through the suit loop, even with the power down situation, to keep us from sweating so much. Would that be okay? Whenever we're doing something in the suit work in the cabin.

CAPCOM Okay. We have to talk about that here.
CAPCOM Yeah, there's no problem with that, John.
ORION Well, thank you. Just a shot, you know,
like maybe 30 seconds worth then quit.
CAPCOM Orion, Houston.
ORION Go ahead, Tony.
CAPCOM Okay. On your cabin gas return, we'd
like to go to Auto.
ORION Roger. Auto on the cabin gas return.
CAPCOM Okay. And on the suit gas diverter, to
Cabin.
ORION Okay, it's pushed to Cabin.
CAPCOM Okay.
ORION Okay, Houston, we've got an ECS H2O
sep light. Isn't that because we have got to go to Sep 2
or something while we're in this mode?
CAPCOM Copy, John, we're working it.
CAPCOM Yeah, the suit gas diverter valve is
chattering and making a sort of a purr. Okay, John, we'd
like you to switch water separators.
ORION Okay, we're in full to Sep 2.
CAPCOM Okay.
ORION Okay, we've still got a water separate
light in here.
CAPCOM Okay, we copy that.
ORION We've got the - Let me tell you what our
configuration is here. We're in full sep 2, the cab gas return
is in Auto, we're on primary LiOH cartridge, the suit figure
release is in Auto. We're in (garble) push to cabin, and our
hoses are stowed against the bulkhead.
CAPCOM Okay, we copy that.
CAPCOM Okay, John, Separator speed is slowly
climbing up there. It looks like it will make it up alright.
It's just a bit slow.
ORION Okay. Fine
CAPCOM Orion, Houston.
ORION Speak, Tony.
CAPCOM Okay, I - They're thinking you may have
the water in the hose problem. They'd like you to drain the
hoses down toward the floor. Maybe we can get some of that
out of there. They'd also like you to hold your hand over
the blue hose and make sure you get a good flow.
ORION Okay, Tony, I'm back up. How do you
read?
CAPCOM 5 by, Charlie.
ORION Okay. This ECS - on -

END OF TAPE

ORION Okay, this EPS on the PLSS to cabin, it sounds like to me that there's a flapper valve or something chattering back in there that is sort of - perhaps stagnating the flow in the loop.

ORION Yes, that is what it sounds like to me too.

CAPCOM Okay, are you getting flow out of the blue hose?

ORION That's affirmative. We're getting it out of there but I feel the same way that Charlie does, it's got something trapped in there.

CAPCOM Okay.

ORION It's coming out in pulses. Matter of fact, I measured play - I can make it play what it sounds like for you. Now what you hear there is the microphone - is the mike brought up against the hose and hose blowing against the microphone. It's not a constant thing, it just sort of chatters like some valve in there is not doing its thing.

CAPCOM Okay, we heard that, John.

ORION Charlie's is the same way.

CAPCOM Okay, John, we'd like to go back to egress on the 2 gas converter and give us a mark when you do it.

ORION Okay, 3 2 1 mark.

ORION Okay, that's egress on the 2 gas converter.

CAPCOM Okay.

ORION Flows good in 2 gas converter.

CAPCOM Okay, copy.

CAPCOM Okay, we understand all your noise went away.

ORION Yes, it doesn't chatter anymore in the PLSS to Cabin valve.

CAPCOM Okay.

ORION Okay, the suit separator light is off now. cf course.

CAPCOM Okay.

ORION Charlie's got the (garble) hundred configured and it works, which I'm not surprised since it was stowed like it was expected to hit like a = - hit a lot harder than we could.

CAPCOM Okay.

ORION One of those 30 G bags. I doubt a camera works.

CAPCOM Okay, John, at your convenience we'd like to go back to sep 1.

ORION You got it.

CAPCOM Okay.

ORION Okay, Houston, I'm up to frame number 30 on Bag A, Charlie's camera and I just finished shooting sort of

ORION a partial pan out the front window. Man
this place is - its - its - its not anywhere flat around here.

CAPCOM Very good, John. A 30.

ORION It's rolling terrain. I really don't
believe we're going to have any trouble at all getting up on
the side of that hill, although the slope - I don't know -
the slopes up toward Canyon look like maybe 20 degrees. We'll
have to take that very carefully.

CAPCOM Rog. What about (garble).

ORION The (garble) is pretty, is like about 10 degrees,
but from there up to Secho and Echo it gets rather steep there.

CAPCOM How about boulders.

ORION It is just like - it is likely described
as very (garble) on Stone - Stone Mountain. We landed in a
block field you know.

CAPCOM Right. Can you see any up on Stone?

ORION No, sure don't.

ORION Yes, maybe there is, when we get closer
to it we'll be able to tell better. I see some funny shadows
up on top of it.

CAPCOM Any problems transportability out on the
EVA.

ORION I told you -

ORION It will be a piece of cake, I think.

ORION Tony, the problem looks like finding a
flat spot to deploy the ALSEP. It's just hummocky, rolling,
terrain with 4 or 5 meter ridges.

CAPCOM Yes

END OF TAPE

ORION (garble) Tony, the problem is looks like finding a flat spot to deploy the ALSEP. It's just Hummocky rolling terrain with 4 or 5 meter ridges.

ORION Yeah, a hundred meters from here, it's going to be on the side of a hill.

ORION We can probably put it over the left there John.

ORION Tony, I looked out -- down to about 4,000 feet access the North Ray area. There was some large blocks, maybe 5 percent of the surface up around the rim but if you look back towards Palmetto they really petered out in a hurry and I think we're going to be in good shape going that way.

CAPCOM Good show.

ORION One final comment here till I get back to work -- about -- in my one o'clock position about 30 meters out, just beyond the LM shadow -- about twice as far as the LM shadow there is a secondary crater with a large meter size block still in it. It looks like if formed the secondary and its got black and white -- the top 3 percent or 5 percent of the block is black and white and the appearance below that is solid white. Over.

CAPCOM Very good.

ORION And those black and white blocks -- you can see them all over the place.

CAPCOM Is the crater round or is it oblong. Can you get a direction?

ORION Yes, it looks like to me it came from South Ray, its oblong stoved in towards Palmetto -- just like those ones down at the cape that they dug out with a bull dozer.

ORION I guess I have to stick to my earlier guess that we were about, maybe 200 meters North and 100 meters long past Double Spot.

ORION The Northern most crater of it. But we'll see as soon as we get out because this is the first place I was ever at on a geology trip that I thought I knew where I was when I started.

CAPCOM Oh come on, you always got it.

ORION After about 2 or 3 hours we always got it.

CAPCOM Are you through with your cabin prep there?

ORION Charlie's loading the EPB, can't but one guy do that at a time because it's too crowded over here.

CAPCOM Okay, the one thing we would like you to see if you could decide before you get out is where you would put ALSEP.

ORION Well, we'll keep looking at it but the trouble is right in front of us about 50 meters there's a ridge and I don't know what's on the other side of that ridge. Out about a hundred meters, I can see alot of blocks and -- but I can't tell whether there are craters out there or not because we're at

ORION zero phase and I just don't think we can
make a prediction at this point.

CAPCOM Okay, copy that.

ORION Those blocks around South Ray are about the
widest blocks I've ever seen -- they're around the rim of that
one.

CAPCOM Okay, and John about the time we saw that
separator spin down, we saw a rise in the suit loop pressure,
we'd like you to confirm that you connected to the suit hoses,
blue to blue and red to red. The stowage on the wall.

ORION Now Tony, that's affirmative, blue to blue
and red to red. Okay it was on the wall. Now they are dis-
connected. The blues are disconnected at this point.

CAPCOM Okay, we copy. Just to put your mind at
rest a little about EVA 1, we're looking at a pretty nominal on
EVA 1. We'll probably give you some new targets for the UV
camera, and we can do that real time and we won't have the TV
when you get out. We'll get it when you get to the crew up
but otherwise it looks pretty -- pretty nominal right now.

ORION Roger Tony. Okay Tony, I've got the EVA maps
out and as I can see gather here, we got 2 --

END OF TAPE

CAPCOM (garble) real time, and we won't have the TV when you get out, you'll get it when you get to the Cool rocks. But otherwise, it looks pretty nominal right now.

ORION Roger, Tony.

ORION Okay, Tony, I've got the EVA maps out and as I can see - gather here, we got 2 maps and 1 return chart. Is that what you agree with?

CAPCOM I'll see, wait a second.

CAPCOM Okay, Charlie, that looks good here.

ORION Okay, I'm going to leave the optimistically leave the walking traverse maps in the cabin.

CAPCOM Alright.

ORION Okay, Tony, the ETB is stowed in my corner.

CAPCOM Okay, very good.

ORION And you know in training, I could barely lift this thing. It's 1/6, its 1 finger.

CAPCOM Maybe this tells me we should do more work on the Moon.

ORION Oh, I'll say. How is the ECS looking to you now, Tony?

CAPCOM Right now it's looking pretty good.

ORION Okay, Tony, we've done all of your sequence here, we got the suits off and stowed, the cabin configured, and I guess were ready to go to an eat period and bed down. Okay?

CAPCOM Okay, I've got a little bit of a check list change I'd like to read up to you here when you're ready. It's in the surface checklist.

ORION Go ahead.

CAPCOM Okay, this debriefing with Houston will be at 10628. The time now is 10635, so we're real close on that. Your eat period is to start at 10643. And then the personal 2 and H2O recharge we'll skip. The feed water recharge we'll skip. On to the next page. The pre-sleep at 10728 and we'll skip the computer work there, that first line in the pre-sleep. And the rest period will begin at 107:53 and number 8, the next step will be at 115:53. That will be post sleep. Again in that section three quarters of the way down on the page, we'll skip the computer work. And the eat period will be at 116:18.

ORION Hey, you lost me, Tony. Okay, here we go on page 37, post sleep. Go ahead.

CAPCOM Rog. Post sleep on page 37. Step 8 there, or my number 8 is at 115:53, that's post sleep. And then three quarters of the way down that page under post sleep there is some computer work, pro verb 37, we'll drop all of that. Eat period will begin at 116:18 and the last line on that column

CAPCOM is top off trace 02, we'll delete.
Okay, on the EVA 2 planning with Houston, we'll skip all that and then we'll don suits on the next page 3-8. We'll don suits at 117:03. Okay, and at the end of that page -
ORION We copy.
CAPCOM Okay, and at the end of that page we'll go to page 2-5.
ORION Okay.
CAPCOM Okay, then we'll prep for EVA1 at 117:53 and then from then on we're nominal.
ORION Okay, at 2-5, what was the time?
CAPCOM 117:53.
ORION Okay, copy. Let me go through this now.
Okay, we've doff the PGA's we're - EVA debriefing with Houston comes next as step 2. Step 3 is the eat period. Turn the page. Step 4 - go ahead.
CAPCOM Okay, just to get our steps numbered straight here, I guess assigning numbers to these things. Debriefing with Houston is step 4, eat period is step 5. And the times you read are right. And then

END OF TAPE

CAPCOM And I guess assigning numbers to these things said debriefing with Houston is step 4. Eat period is step 5 and the times you read were right and then the presleep is step 6 and the -- each number goes on from there.

ORION Okay, Presleep is 6, then we wake up for post-sleep and that's number 7.

CAPCOM Rog. Rest period is number 7.

ORION And we get -- oh okay, rest period is 7, I see. Okay. And then 8 is post sleep.

CAPCOM That's affirmative.

ORION And skipping the computer activity stuff, number 9 is the eat period and we delete the top off the PLSS, we turn the page, we skip -- well we skip EVA 2 planning, we turn the page and step don suits is next.

CAPCOM Right that's number 10.

ORION And then step 10. Okay, then we go to 25 and we're just about back to nominal then.

CAPCOM Rog. And that's step 11 on 2-5.

ORION Copy.

CAPCOM Okay, have a good meal.

ORION Okay, Tony let's -- let's do the debriefing. We don't really -- I'd like to describe for a LM window description, we had so much practice at that, I'd like to see how I could do.

CAPCOM Aw, have at it, we'll take any words you've got. We expended all our questions a few minutes ago with John, and in fact I didn't even have to ask any, he just answered them all, so but press on.

ORION Okay, looking out at 12 o'clock on the horizon there is a very hilly subdued region, well let's say hilly terrain at 12 o'clock. It goes on out of view around to 11. It's a rolling with white pock marked craters there and I'd say that's maybe 50 to 100 meters above the surrounding terrain where we are. You move around from 1 to 3 o'clock approaching the -- at about 1 o'clock I would say we can see maybe a kilometer or so but it might be very deceiving on that distance and we see more rolling terrain similar in Albido, it's a light gray with fresh craters being white. As we come on to 3 o'clock 2:30 to 3 the near ridge that was on our map so that blocks out North Ray and Stone Mountain is a correction, Smoky is really there and it's about a -- oh a 3 to 4 degree slope and the ridge maybe goes up 10 to 15 meters. As we come into the near field at 12 o'clock it excuse me at about -- in front of the lunar LM maybe 50 to 100 meters there's this other low ridge that we described beyond that we can see a depression or -- and then it rises again to another ridge, which is probably -- goes into Spook Crater. I think I can see Spook on the horizon at about my 12 o'clock position. As we -- that is Boulder covered. The largest boulder I see is perhaps 2 to 3 meters in width and they're angular and

ORION those are -- there are 3 of those boulders and one is at 12 and the other 2 are over at about -- on that second rise away from us at about 1:30 and I'd say those boulders are smaller down to 1 meter cover maybe 1 percent of the surface. The trafficability out that way looks good as far as the boulders go. It's going to be up and down though. As we come into 2:30 from 50 to 150 meters, I've already described that bright fresh crater with the small blocks around it, more cobbles really. Beyond that, there are 2 other craters, which sort of trend into this depression that runs north south here. There's a boulder beyond that at 2:30, which is partially buried, it has a good fillet on the south side to the north side and to the east side there's no fillet at all. As we come on into 3 o'clock in the near field I see a good size crater perhaps 30 meters to 50 meters at 2 o'clock on the in-board side, that's my side of this ridge and we have maybe 10 percent of the surface covered with blocks, less than half a meter. Over.

CAPCOM Very good Charlie. Where again was this boulder with the fillet.

ORION It's at about 2:30, it may be a couple of hundred meters out --

END OF TAPE

DUKE You know the surface covered with blocks by less than half a meter. Over.

CAPCOM Very good Charley. Where again was this boulder with the fillet.

DUKE I - - it's about 2:30, maybe a couple hundred meters out. And it's on the - - on this side of the ridge that trans east west here and it blocks out Smokey.

CAPCOM Okay. Could it be sliding down the ridge and that's why the fillet's on the South.

DUKE That might be the reason. I was just going to say, it's down slope so that might have been what happened.

CAPCOM I got you.

DUKE Though the slope doesn't appear that steep Tony.

CAPCOM Okay. How about the buster area, can you identify that?

DUKE Well, that's really - - We sure saw it on descent. I don't see it right now. There's a bright ray - - a bright crater to the right, maybe 50 meters of what I think is Spook which is probably Buster. I really wouldn't swear to it.

CAPCOM Okay. Can you tell boulders over there?

DUKE There's not a one as far as I can see.

CAPCOM Okay.

CAPCOM Very good Charley, you're right up to your old peak.

DUKE Coming down on - - Okay, coming down Tony on descent it looks - - as John has described there's a distinct ray pattern across our landing site from south ray and the boulders get - affectively disappear by we get to Palmetto. And then they don't reappear again till almost the blank of north ray. As you can see that depression that trans out without a north ray. And you can see the ridge line that I think will be an excellent way to climb up to north ray in the rover. And this was all from 5000 feet so I might be a little off on that, but at least the general impression was good. We could see Doglegs, we could see Cat, all of the craters that were on this stop were plainly visible. Hopefully they'll be so when we start navigating on the ground.

CAPCOM Very good. You were mentioning the boulders and the rays and South Ray. The ray itself, could you map out what extent it was or was it just the whole general area.

DUKE It was a pretty wide ray coming across here. I would say it goes from our position perhaps to Spook. And maybe behind us maybe another hundred meters or so.

CAPCOM Very good. How about left-right extent, did it go all the way back to south ray?

DUKE Well, you'll have to ask John that, I couldn't see out that way. As we -- the biggest blocks that I saw was when we flew over which is maybe a hundred meters to 200 meters behind us. And it looked like a Volkswagon size.

CAPCOM Very good.

DUKE John is off comm momentarily, he'll be back up in a little bit. And I'm going to start the chow. And Tony I wouldn't give you 2 cents for that orange juice as a hair tonic. It mats it down completely.

CAPCOM That might be the point. We'd like to go your suit gas return back to cabin. Give it a try.

DUKE Okay. We'll try it in cabin. We also tried this in orbit and we got the same sound Tony. We're going to cabin now. Mark. Okay, again it's the same sound.

CAPCOM Okay, we'd like to go back to egress.

DUKE Hey, Tony. I tell you what it is. I just opened the cabin gas return and it stopped it. What is was that the cabin gas return check valve is not working right. The flow is great now. Our configuration is suit gas diverter push cabin and cabin gas return to open and everything sounds normal.

CAPCOM Okay.. We'd like to leave you that way.

DUKE Okay. Have you guys got a suggestion of what meal you want us to eat?

CAPCOM We're working that one.

CAPCOM Okay.

DUKE I got day 5, meal B.

CAPCOM I guess we'd like you to just go ahead with your first lunar meal. I guess thatdeserves some champagne I don't know.

END OF TAPE

ORION Okay, I've got Day 5, Meal B.
CAPCOM I guess we'd like you to just go ahead
with your first lunar meal. I guess that deserves some
champagne. I don't know.
ORION Well, like John said earlier, we're
definitely not going to get scurvy; we've got so much orange
drink here.
CAPCOM Roger.
ORION Okay, Tony, we're going to eat Day 5,
Meal B.
CAPCOM Okay, was that Dog?
ORION Bravo as in boy.
CAPCOM Rog.
ORION Houston, John finally found his spoon.
CAPCOM Very good.
ORION Hello, Tony. There goes COMM. Tony?
CAPCOM Go ahead.
ORION I can't see how far the (garble). I
just assume that this is a blocked field we're in from of South
Ray. It goes about 100 meters out at 10 o'clock and goes
over a ridge and disappears. The next time I see it, it's
at South Ray; which is, you know, pretty far away from here.
South Ray is a doggone interesting crater. I wish we could
get to it. The boulders on the west rim of it are just thick
and white as they can be, and in the middle of it - you know,
on your map where it looks like it's a depression - there
appears to be a brown - a sort of a gray patch of dirt or
something that was thrown out of that side of it. And then
on the north there's another ray of very white boulders coming
out of it. Of course, we could see the ray pattern long be-
fore pitch over. At 22,000 I was able to get my nose up
against the window and see the clue to where we were was
South Ray. Because at 22,000 and at a 60 degree pitch angle,
we couldn't even see Stone Mountain or any of the things in the
rear, but you just didn't have any doubt in your mind it was
that big crater. And the way the pattern went, you work your
around the pattern. We'll use the same gauges to find out where
we're going to land that we used on the L&A. The inverted V off
of Stubby, Cove, Trap, Stubby, Wreck, Trap and works into Cove,
Hidden Valley and into Spook and from Spook off those small craters
into Double Spot. Now, I think we ended up landing right
around one of the smaller craters that sort of form a hook
off the side - the far side of Spook, going back into Double
Spot; and I think we're about 50 meters from it at 9 o'clock,
but -
CAPCOM How about the albedo?
ORION I can't -
CAPCOM How about the albedo?

ORION Tremendous difference in albedo. The North Ray is pure white - South Ray is pure white and it blends into a gray, and then over here by us, it's almost totally gray. I guess you - I just get the feeling that these rocks may have come from somewhere else. There's a big subangular rock that I see at 10 o'clock, no at 11 o'clock at about 100 meters that I would sure like to go over and look, because it looks like it's just one big piece of whatever rock it is

CAPCOM Charlie, I was wondering about - -

ORION Oh, and I do happen to see a white glass in the bottom of it.

CAPCOM I was wondering about the albedo on your surface chart. The strips and things, whether the lay - whether the rays are as obvious as they are on the high sun angle chart that you're carrying or whether they look very much different at the low sun angle.

ORION No they're not, I don't think. I can - I can see from here down to Survey Ridge, and -

END OF TAPE

CAPCOM That much difference at the low spin angle.

ORION No, they're not I don't think. I can -- I can see from here down to Survey ridge and it is Albido on there is alot lighter. It's a general gradual downslope from our landing point to Survey ridge and it looks like it drops maybe a hundred meters and then starts to go right back up Smoky Mountain. I guess you could see on a contour map where the low spot is. Okay, there are some strange looking craters over there on Stone mountain and the Albido contrast is really -- really pronounced in those craters. There's some -- it may be a function of shadow, we better wait til we get over there. I hesitate to say, they almost look like big -- well they must be impact craters.

CAPCOM Okay, I was just wondering about whether you could recognize whether your on a ray by Albido as well as the boulder content.

ORION I think you're going to be able to but boy, you're not going to pick up a contact -- it's just going to -- it's -- you know it falls out into something.

CAPCOM Outstanding, that's better than (garble)

ORION We might be able to work across the contact. But you mainly would do it by the white boulders in the ray I think. I can see on the ridge lines -- from here I can see 3 different rays out of South Ray, I believe. Have to go down there and look at it to make sure. They seem to be riding on the ridge lines although that's probably deceptive because I can't see down in the -- I can't see down in the rolls. Tony, one other comment from us, distances are pretty deceiving here for me. I'm looking out over John's shoulder and it looks like to me you could through a rock into South Ray from our present position, which is -- I know impossible. A second comment has to do with the orbital, since we got so much look at the ground sailing around waiting to come down. Everywhere that we could see -- everywhere we saw the ground, which is just about the whole sunlit side. In the crater walls and on the ridges you had to -- we had the same lineation that the Apollo 15 photography showed on Hadley, Delta and Hadley Mountains. It was really remarkable how in the crater walls primarily, and in the ridges -- it gave you the impression that it was a fracture pattern that was all trending parallel to the -- concentric around the craters, in the craters and on the ridge though they were sort of either parallel to the ground or at some dip be what that may. Over.

CAPCOM Okay, very good.

ORION And I'm looking out here at Stone Mountain and I got a picture of it and it looks like its got -- looks like somebody has been out there ploughing across the side of it. The benches just look like one sort of terrace after another, right up the side. They sort of follow the contour of it right around.

CAPCOM Any differences in the terraces?

ORION No Tony, not that I can tell from here.
Those terraces could be raised out of Stubby or something like
that.

CAPCOM Okay, you mentioned 2 different rock types.

ORION I can see Stubby has a -- right at the edge
of Stone, Stubby has got much steeper walls going off of Stone
Mountain than I originally imagined it. It's -- I don't think
Stone Mountain came up to Stubby and stops.

CAPCOM Okay, you think Stubby is punched into the
(garble)

ORION Well, that's my guess from here but then
again it's -- the thing is so steep that the whole side of Stone
Mountain right now from a good half of it is in shadow.

CAPCOM Okay. Go ahead Charlie, one thing, you
mentioned 2 rock types -- the black and white ones and then the
all white ones. Do you see anything else.

END OF TAPE

CAPCOM Go ahead Charlie. One thing you mentioned two rock types, the black and white ones, and then the all white ones. Do you see anything else?

ORION Yes, there was one right out in front of the LM here, just right down at the - just to the right of the foot pad that looks like a breccia to me, Tony. Or - either that or an indurated regolith. We'll tell you when we get out.

CAPCOM Okay.

ORION Tony, we'll give you an analogy of what that black and white rock looks like. It's really a gray and white and looks like a granitic rock with very large crystals to it, though I kind of doubt that.

CAPCOM Outstanding. You're really wetting our appetites.

ORION There are really some interesting rocks out here. I see some that are pure snow white and we've got the whole - we get the whole run of them. It's hard to tell at this sun, with this sunlight, which is so bright on the surface just exactly what color these things are, even with the naked eye. You know, it's very deceptive. I swear I see one out there with some pink in it, but we'd better wait until we get out. We'll pick it up and make sure.

CAPCOM Roger, I understand.

ORION What do you call tomato soup made with cold water, Tony?

CAPCOM Awful.

ORION John says cold tomato soup.

ORION Hey, Tony, when you get a chance, could you take a look at that ridge at 12 o'clock, which you described as 50 to 100 meters out and see if that continues on around 010 and 9.

CAPCOM Yes, it does.

ORION Okay, continues on around to my side.

ORION John's original observation was that we look like we're in a big old subdued crater and that's really what it looks like, Tony.

CAPCOM Okay.

ORION Man, those black and white rocks really look interesting, Tony. I just can't wait to grab one of those.

CAPCOM I tell you, Charlie, we feel the same way.

ORION In fact, the impression you get is that it's - it almost looks like the color of labradorite.

CAPCOM Oh, Charlie.
ORION Tony, I guess it's really a bluish cast.
It's instead a real black to me, but in this sun it looks bluish.
CAPCOM Right, we understand.
ORION Well, we'll bring small one of each. I'll
tell you one thing, I'm glad we brought the rake, because
we really can do it.
CAPCOM Very good.
ORION We can get a rake sample out in front
of the lunar module in one scoop.
CAPCOM Okay, and when you get a chance, we'd
like you to stow those hoses. I guess we don't have enough
friction in there and the water separators are running wild.
Okay, and if you can pull yourselves away from the window
there, we'd like you to hold to the schedule and start pre-
sleeping in about 20 minutes.
ORION How can we start presleep in 20 minutes
when we haven't even gotten to eat yet, Tony? For goodness
sake.
CAPCOM Okay. Hey, the backroom gave you a bravo
on your descriptions there.
ORION I'm like a little kid on Christmas Eve,
Tony.
CAPCOM (garble)
ORION It really is neat to have a gravity field
around to set stuff on. That is really the cat's meow. HA HA!
ORION Okay, the hoses are hooked back up, Tony.
You should see some decrease in the separator.
CAPCOM Okay.
CAPCOM I think I know how you feel, Charlie.
I'm pretty turned on myself.
ORION Tony, how is CASPER doing?

END OF TAPE

DUKE And don myself.
DUKE Uh, Tony, how is Casper doing?
CAPCOM Say again Charley.
DUKE How is Casper doing?
CAPCOM Uh, everything's fine up there. I just look over occasionally. He's been keeping me so occupied here, but they've got no problems.
DUKE Boy, you can't imagine how nice this 1/6 gravity is. This is the first time I've been able to eat soup without knowing whether I was going to eat it or take a bath in it. And Tony, John and I just like to give our thanks to back room guys and everybody that worked so hard on Casper's problem giving us a chance to get here.
CAPCOM Rog, Charley, I think everybody around here appreciates their job.
DUKE Gee, I'm sure glad somebody was able to come to that conclusion cause it sure look black there for a while, didn't it?
CAPCOM You betcha.
DUKE I'd like to get sombody to put into words that (garble) in the sky and tell us to let's make it a little more nominal from here on out.
CAPCOM I'm all for that.
DUKE That was to much like a sim.
CAPCOM Orion. Houston.
DUKE Go ahead Tony.
CAPCOM Would you verify that the 02 demand regs are in cabin?
DUKE It's verified.
CAPCOM Okay. We copy that. It looks like the pressure was dropping down a little bit. And while you're eating there I might brief you on a couple of things. At about 108 hours which is about time you'll be going to bed there, the RCS pressure will build up to the front where you'll get an RCS light again. And just reset, there's nothing to worry about. And then sometime just before you wake up in the morning you may very well get a second caution light and alarm when the thrush pressure - - heat and thrust pressure gets built back up to 1700. And if you go to helium monitor on the temp press gage there that'll go away. There's no way we can inhibit that.
DUKE Okay, Tony. Thank you.
CAPCOM Okay.
YOUNG Okay, in other words we're going to wake up twice tonight already, uh.
CAPCOM Yeah, probably. The first one should go off before you get to bed though. But that second one will

CAPCOM probably come on before - - just before you should wake up.

DUKE Okay. How much sleep from the time when we start to bed do you want us to get?

CAPCOM 8 hours. You're going to stay in an 8 hour rest period.

DUKE Okay, Tony. We're about to fill the drink bags and what we're going to do is refill the ones we had this morning. Use with just plain water. Over.

DUKE Copy that Tony?

CAPCOM I already copied that, we're just trying to figure out - - I wonder why you're not using the gator ade? It's right there, I wonder if you - -

DUKE Well, we drank one bag. Okay, we drank one bag. The stuff we filled from the command module this morning we drank. And that leaves us with two bags for two subsequent EVA's. And we could fill one of the other bags and just drink water on the 3rd or whatever you want us to do.

CAPCOM Oh, we don't care. Do whatever you want there. Water is fine.

DUKE Yeah, we'd rather save the fortified stuff till the last.

CAPCOM Okay. We understand.

DUKE Okay, Tony. What's our GET right now?

CAPCOM 107:31.

DUKE Okay. What - - who do you want on biomed tonight?

CAPCOM Okay, Charley. It's your turn.

DUKE That's what I was afraid of. Okay. You've been looking at me since landing so we'll just stay right here.

CAPCOM Okay.

END OF TAPE

ORION We'll just stay right here.
CAPCOM Okay. Okay, while you're worrying about that your comm configuration for the night will be S-band power amplifier secondary at present. The telemetry will be low, voice will be down voice backup, range will be off and you're on biomed.
ORION Okay, staring, go through that again.
CAPCOM Okay, it's S-band power amplifier secondary at present, telemetry low, voice will be down voice backup, range off and you're on biomed.
ORION Thats down voice backup, biomed lights, telemetry low. Thank you.
CAPCOM Okay, you're pretty weak there for a second Charlie. Try it again.
ORION Okay, down voice backup 1 2 3 4 5 4 3 2 1 Over.
CAPCOM Okay, that's much better. Charlie Houston.
ORION Go ahead.
CAPCOM Okay, at your convenience I have some changes to your emergency liftoff checklist in the surface checklist. Just give me a call when you're ready to take it.
ORION Standby. Tony I'm ready to copy, if you'll give me a page.
CAPCOM Okay, it's in the surface checklist 11-1.
ORION Okay, you speak.
CAPCOM Okay, on the PGNCS activation -- it's down in the bottom left hand side. The last entry there is go and hold till standby light off, cross that line out. And add the line underneath CB of circuit breaker, panel 11, LGC/DSKY-CLOSE.
ORION Okay, go ahead.
CAPCOM Okay, on the second column, they have a correction to the checklist, it says circuit breakers 16, -- circuit breaker panel 16 and inverter 1 close, that should read circuit breaker panel 11 inverter 1 close. Then we'd like to insert --
ORION Okay, got it.
CAPCOM Okay, and we'd like to insert underneath that line, circuit breaker panel 16 inverter 2 close and inverter switch to 2.
ORION Okay, inverter to 2, cross out inverter 1
CAPCOM Right. Okay on 11-2 underneath on the left hand upper side you have asterik CB 11 and 16 underneath that line write in P ephemeris update if available for MSFN.
ORION Okay is that an uplink or do we load?
CAPCOM Standby.
ORION Okay Tony, John thinks it's plus 25 907 enter 1706, enter and don't load the ephemeris and I think that's correct.
CAPCOM Roger Charlie, that's correct.
ORION Okay, go ahead, any other words?

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CAPCOM Right on -- I've got on your circuit breaker configuration here, I've got some that will be open and you might as well note that they will be open and that's okay, so on 11-3 panel 11, first line there, S-band antenna will be open.

ORION Keep going.

CAPCOM Okay, and on 11-4, 4

END OF TAPE

CAPCOM -3. Panel 11, 1st line, S-Band antenna will be open.

ORION Keep going.

CAPCOM Okay. And on 11-4, 4th line, Panel 16, S-Band antenna will be open.

ORION Okay, go ahead.

CAPCOM Okay, and we go on to 11-6 now. You have the set-up for your steerable antenna and you can just cross all that out; and that's the end of it.

ORION Okay. We copy all of those updates. The only one I don't understand is on 11-1, on the PGNCS activation, (garble) - we crossed out the probe and added an LGC DSKY closed and right before that it says LGC DSKY closed.

CAPCOM Okay. You're right. That's an error on our part. Just cancel out our addition.

ORION Okay. No problem. I just thought maybe something went by me, there.

CAPCOM Right.

ORION Okay, Tony, if that's everything, we're ready to go to bed.

CAPCOM Good show.

CAPCOM Okay, we're through with everything here, and we're all set to let you go to bed. You're going to bed, I'll have you know, a whole 6 minutes early. I guess the government can allow you to have that time off.

ORION Okay. I'll be on comm, John will be off comm, and we're going to turn off the lights now.

CAPCOM Okay. We'll see you tomorrow, and we're sure looking forward to it.

ORION Hey, so are we. Guess what. You turn all the lights off and it doesn't get dark. It's daylight outside. Hey, Tony, one final word. Our ECS configuration for sleep is push cabin, cabin gas return in Auto, and the rest of the thing is advertised. Over. Correction - cabin gas return open.

CAPCOM Okay, that looks good here.

ORION Okay, Tony, we'd like to thank everybody for the great job of regrouping, and getting back to what seems to be pretty nominal from now on; and we'll see you in the morning. I guess you can give us a reveille call over the squawk box here. Over.

CAPCOM Okay, I'll sure do that. I'll come in and I'll whistle something here.

ORION All right. Good night.

CAPCOM Good night.

ORION Houston, Orion.

CAPCOM Go ahead, Charlie.

ORION Well, I guess I can't stop talking. One final observation, Tony, is that due to the lack of dust that we had on landing and the fact that we can see blocks embedded in the side of these craters, here, I kind of got the distinct impression that the regolith is not too thick around here, and we ought to maybe think about where would be the thickest place to - in order to get the drill in. Over.

CAPCOM Okay. That's a good observation. From the films you've seen of other descents, do you think the dust was less than any of the others?

ORION Well, John will have to really comment on that, but as far as my side goes, the little I looked out there was by far - we could see - or, I could, on my side, see right on down through it - the dust film.

CAPCOM Okay, and from your - listening to your descent, it sounded like you picked it up about 90 feet.

ORION It was a little bit less than that. It was about 80, maybe 75.

CAPCOM I have a feeling you and I could just sit up all night and talk about this.

ORION Well, that's all you're going to hear from me. Good night.

CAPCOM (laugh) Okay, good night.

PAO This is Apollo Control at 107 hours and 59 minutes, and at this point, we have caught up with all of the back-log of tapes that was accumulated during the change-of-shift press briefing and which continued to pile up on us as we were replaying the tapes that we had already accumulated. We are up to date now and standing by live, and we believe that third good night, or at least hope that third good night, was the final one. We don't expect to hear from the crew now for about 8 hours aboard Orion. We are in contact with Ken Mattingly aboard the orbiting Command Module - Command Service Module, Casper; and we'll be picking that up and standing by until Ken Mattingly completes this revolution and goes behind the Moon, and we expect he also before much longer will be getting a rest period. Based on the data received from the Lunar Module Guidance & Navigation System during the landing, we have come up with a set of landing coordinates which agree very closely with the estimation that John Young gave of the Spacecraft's position. Our coordinates from the calculations here on the ground show the Lunar Module Orion to be located about 430 feet west and about 900 feet north of the planned target point. If I remember correctly, Young estimated that they had come down about 200 meters west and about 100 meters north of a crater very near the landing site, and

that crater was Double Spot Crater, which is just slightly to the south and west of the LM site. So the two numbers would be very comparable. The numbers that I gave, the 430 feet west and 900 feet north are with respect of the landing site - the numbers that Young used. His estimate was 200 feet - or 200 meters, rather - west of Double Spot Crater and 100 meters north, which is about the same location, as best we can tell, as that we have computed. The coordinates of this landing point would be 8 degrees 59 minutes and 13.2 seconds south and 15 degrees 30 minutes 48.6 seconds east. We do expect that these coordinates will be updated, particularly if Ken Mattingly is able to get some tracking data from orbit. Using the CSM sextant, he plans to try to take some landmark sightings on the landing site and will also get an additional fix based on crew observations once they get out and get a chance to look in a little more detail at the surrounding landscape. At this point, we'll switch over to our second air-to-ground line and stand by for any conversation with Ken Mattingly aboard the orbiting Command Module, Casper.

END OF TAPE

APOLLO 16, MISSION COMMENTARY, 4-21-72, CST 24:00, GET 108:06 MC397/1

CASPER Yes, here comes our old friend, Langrenus.

ORION Okay, Ken, we need barber pole plus 4.

CASPER You need a little barber pole, don't you?

Okay, that should be 1 plus what we have.

PAO Astronaut Stu Roosa is serving as spacecraft communicator for the command module. Our spacecraft communicator for the LM is Astronaut Don Peterson.

CASPER Hey, Stu, if I put 30 frames on this Crozier I won't get that first strip of (garble). You think about doing away with the intervelometer and taking the pictures with less overlap and try to squeeze it all onto this one mag.

ROOSO Okay, stand by. Let's take a look at that, Ken.

CASPER Okay, I got a couple minutes before I start.

ROOSA Okay.

ROOSA Okay, Ken, you can go ahead and disregard the interfelometer and try to get them both on that same mag.

CASPER Okay, thank you very much. I'm all set up. Come up on Crozier.

ROOSA Okay.

CASPER Well, it looks like I ran out anyhow. I got 165 and the magazines empty, and I just finished the strip of Crozier.

ROOSA Okay, I copy that.

CASPER (garble) magazine. November - November.

ROOSA Okay.

CASPER And I'll go see if I can get Papa Papa out here real fast.

CASPER Okay, Papa Papa is out and loaded. I'll try to pick up Descartes to (garble) with him.

ROOSA Rog.

END OF TAPE

(Music)

PAO This is Apollo Control at 108 hours 21 minutes. We have heard no - - nothing further from the crew aboard the lunar module Orion, Charlie Duke and John Young since we last said good night. But we do have about 40 minutes of acquisition time left with the command module, Casper which is presently in an orbit 66.8 nautical miles by 53 nautical miles. And occassionally we are etting bits and pieces drifting through the communications of what sounds like Marshall music that Ken Mattingly is playing on the onboard tape recorder. And as the level reaches the high enough point that is triggering his vox, the voice operated relay and the communication system and we'll get a snatch of it here and there. Mattingly at the present time is getting caught up on his normal flight plans and we expect he will be caught up by about 109 hours 30 minutes at which time he's scheduled to begin an 8 and half hour rest period. At present time he's involved in keeping the SIM bay operating and taking a series of photographs. And at about 109 hours 17 minutes he is scheduled to start in on the pre-sleep checklist. We'll continue to stand by live for conversation between Ken Mattingly and CAPCOM, Stu Roosa. We'll be in a record mode for any conversations with the lunar module and we'll play those back following their receipt. Should we hear anything from Young or Duke aboard the lunar module - -

(Music)

MATTINGLY And another strange sight over here, I think it's Annbell, it's where it's suppose to be ending the strip. But there's another crater here that looks like it's flooded, except this same flooded material seems to run up on the outside. You can see a definite patch of this stuff that's run down inside an old crater. And that material at least lays on top of it, but it lays on top of things that are outside and higher. It's a very strange operation. I guess we'll have to wait and let someone that knows what they're talking about look at the pictures.

CAPCOM Al right, Ken. Sounds real interesting.

MATTINGLY Man, this place in unbelievable. It's really something. Everywhere you turn, it's something new. And let's see if we can get in the old SS on Ptolemieus here.

MATTINGLY Well I'll tell you what. I'm going to have to skip Ptolemieus. The terminator is still on the rim.

CAPCOM Okay.

MATTINGLY Just for kicks though, I'm going to show you one on frame SS, that is really facinating. And I'm just under the eastern rim of Ptolemieus. I just mentioned last time, I'm going to take a little strip of these. Man, that ought to be good enough. Okay, I took it up to 20 frames and I used about five of these on SS. And what I took it of was this

MATTINGLY material that's on the eastern rim of Ptolemieus
It has the same textural appearance in the - - that we saw in
the Descartes formation. That being the stuff coming from the
crater Descartes running north yesterday. An entirely different
appearance than the rest of the terrain in the low sun. I think
there may be some interesting comparison there.

CAPCOM Okay. Ken. Got that. And you're approaching
30 seconds to - -

MATTINGLY Okay, going to end up pan camera off here
somewhere.

CAPCOM Rog. You are by my mark, you'll be
25 seconds. Mark. And, Ken just turn the cameras off there
then before you continue on with those steps. I want to say
something about those procedures on down at the bottom. I'm
showing 7 seconds.

MATTINGLY Okay.

CAPCOM And Mark. I show T stop. That's the pan camera
and mapping camera.

MATTINGLY Okay. There - Stand by. And off. I'll wait 30
seconds before I take the image motion off. Hey, thank you
Stu, that was a big help.

CAPCOM Rog. And - - we're going to delete on those
procedures there, the mapping camera retract, and the mapping
camera laser altimeter cover closed. We're going to leave
those out all night and we'll have a plan tomorrow on how
we're going to handle the mapping camera.

MATTINGLY Okay. You do want the laser off. Is that
correct?

CAPCOM That's affirmative.

MATTINGLY Okay, the laser is off now. Mapping camera
going to stand by and the image motion is coming off.

CAPCOM Jolly good.

CAPCOM And Ken, a couple of other items. We're
going to let the Bat A charge all night, so we'll just leave
that as is.

MATTINGLY Okay. Those batteries kinda put in a day's
work too today.

CAPCOM Rog.

END OF TAPE

~~CASPER~~
~~ORION~~ Okay, I see that we're going to have AOS on the next pass before we get -- before the sleep period starts, so I think I'll wait and give you my film summary at AOS, if that's okay. It'll take me that long to sort it all out I'm afraid.

CAPCOM That's okay Ken.

CASPER All I was planning to give you was how much was left in each mag.

CAPCOM Say again Ken.

CASPER All I was planning to give you was how much is left in each magazine.

CAPCOM Hey, that's jolly.

CAPCOM And CASPER Houston.

CASPER Okay.

CAPCOM Okay I got a couple of things. Ken one is we would like to delete that film status report. We would like for you to start your rest period just as soon as you can after LOS and let us pick up any talking about the film or anything like that for tomorrow.

CASPER Oh, very well. (garble)

CAPCOM And another thing, we're noticing indications here that your screens here on your O2 return hoses and also the suit circuit return valve. You might take a look at those tonight and see if they need a little cleaning.

CASPER Okay, I've been cleaning the suit circuit return screen every night and its been getting pretty dirty so I'll check it again tonight and the other hoses, I've got a -- except I didn't have a screen for the inlets. I capped the inlets and just used the outlets to keep stuff from -- we got so much junk here I didn't want to get stuff inside the hoses down through the suit fans and to clog up the other filters.

CAPCOM Okay.

CASPER I'll put the interconnects on the inlets and just let the air blow out of the hoses and take it all in through the suit circuit return. That might give you a little higher pressurize.

CAPCOM Okay, we concur with the configuration and but we have noticed the O2 flow creeping up slowly, indicating that it would probably need a little housecleaning on that screen.

CASPER Yes sir, thank you very much. I'll catch that baby.

CAPCOM Okay.

CASPER I'll tell you this is -- a man shouldn't get paid for doing this.

CAPCOM Yes, it really sounds great Ken, I think the difference in the Earth crewcent sure must made a difference, the way you're talking of earthshine versus the way I thought.

CASPER Oh, it's fantastic. You can see the whole thing. It's really something. I'm going to try that -- that's

CASPER the reason I wanted to try and get these earthshine pictures in this time before the Earth gets any smaller. Because it really isn't nearly as dramatic tonight as it was last night and I don't know whether that's the altitude or what, but if I (garble) run these booms out and what else. Got to turn the pan camera off. Okay, if you'll give me a call on those.

CAPCOM Rog. I'm watching for you on the boom deploy Ken. You got a little less than 5 minutes.

CASPER Okay, you know something else that I'm not real sure about. It sure looks to me as though the Earthshine is not as bright on this mare. I guess it's just this mare that's over around Fra Mauro and so forth is just darker and maybe it's my night adaptation that hasn't taken affect yet, but I got the distinct impression that (garble) it's a lot brighter when you get over to the western LM.

CAPCOM Okay, got that Ken.

CASPER I don't think I understand that. I tell you, I thought this was kind of appropriate here a few minutes ago I was playing Berlioz's symphony fantastique and looking at this fantastic sight and floating along here. It's just unbelievable, it's so much fun.

CAPCOM Yes, it sure sounds like it, in fact we were catching a little of your music occasionally there. Didn't sound as good as Ride no paint but I guess it'll do.

CASPER (garble) Well, I've been listening to old paint kind of music for 3 days of PTC but it was good old paint, I'll have to admit. I enjoyed it.

CAPCOM And CASPER Houston.

CASPER Go ahead.

CAPCOM Okay, what we'd like to do now Ken is go ahead and put out the booms now and as soon as you have them out go ahead and start the -- start your P20 running right now. It looks like we might be cramped a little bit to get your uplinks in and we want to make sure that we get -- all of the uplinks completed here.

CASPER Okay, in other words you want me to cancel the Earthshine.

CAPCOM Yes, that's what we are saying Ken. We're just afraid we might be cutting it kind of tight on the uplink.

END OF TAPE

CAPCOM I -- that's what we are saying Ken, just
afraid we might be cutting it kind of tight on the uplink.
CASPER Alright, that's in work.
CAPCOM Okay.
CAPCOM Okay Ken and we can take the pan camera power
to off. The lens is stowed.
CASPER Okay. Pan camera power is off.
CAPCOM Okay.
CASPER Okay, and I guess I might as well go ahead
and put the booms out hadn't I.
CAPCOM Rog. We'd like to have those out and as soon
as you complete that, let's go ahead and do the -- go into the
P20 that we're showing at 108 plus 50. Let's don't wait for that.
CASPER Okay, I'm already going there.
CAPCOM Oh okay.
CASPER I'm doing a manual roll to get over there and
spin it around.
CAPCOM Okay, very good.
CASPER And I guess I'd like to have a SIM Bay con-
figuration but what you think I should have at the end of --
while you're ready to go to bed, what mechanical and electrical
status and let me cross check it to make sure I haven't forgotten
something.
CAPCOM Okay. We'll get that for you.
CASPER Holy Smokes.

END OF TAPE

CAPCOM And Casper, Houston, we've got that SIM bay configuration when you're ready.

CASPER Okay, go ahead.

CAPCOM Okay, it is your normal sleep configuration, with a change in the first digit of the top line. We going to change that 0 to a 1. You will now have a configuration minus 11111. Second line is normal 01222.

CASPER Okay, minus on 1 01222. Thank you sir.

CAPCOM Rog. and we'd like

CASPER And follow the inlet screens and your right they're - go ahead.

CAPCOM Okay, I copied your bit on the screens and we'd like BD roll for sleep tonight.

CASPER Okay, you'd like to do a BD roll. Okay. How does the general RCS picture look?

CAPCOM We're in good shape, Ken, we're down a little on the flight plan, but we're riding 168 above the redline. We're - on the flight plan we're down a minus 133.

CASPER Okay.

CAPCOM And.

CASPER (garble) afternoon.

CAPCOM It'll all get done. You're doing a great job, Ken.

CASPER Well, I'm just real sorry about the delay this afternoon. I wish I had known more about it. I'd already decided that if it was just oscillatory and stable I was going to take it.

CAPCOM Yes, well I tell you, the traces on those up to the time that you turned off the gimbal motors were just a classic divergent curve, right out of the textbook.

CASPER Yes. Yes, I couldn't believe it when I saw that thing. I was back in flood simulator.

CAPCOM Yes, I think there has been a lot of people talking about SIM suit today. Wish we could just forget this one.

CAPCOM But, hey, I got a couple other reminders here while we're chatting, I'd like to remind you on your presleep checklist that we'll not bump up the cabin tonight.

CASPER Okay, thank you.

CAPCOM And, Ken a couple other - or one other item here, you might get a leg up on your presleep checklist and check the optics power off at your convenience.

CASPER Okay, I'll get that stuff in just a minute.

CAPCOM Okay, I wasn't trying to hurry you, I just wanting to toss in a little reminder there.

CASPER Yes, thank you, I think left it on last night.

APOLLO 16, MISSION COMMENTARY, 4-21-72, CST 00:39, GET 108:45 MC401/2

CAPCOM That isn't what I was trying to say, Ken.
CASPER Laughter. Well, you know what was going
on last night and this morning. Everything you said was true.
I got a garbage can in here that's bigger than me.
CAPCOM Rog.

END OF TAPE

CAPCOM And we'd like to have OMNI Charley now, Ken and when get the attitude you can reacquire with high gain.

CASPER Okay. Yeah, that is better. (Music)

CASPER Hey Stu, I kinda turned the tank off this morning when you tried to give us a SIM bay status report. I think this morning wasn't a convenient time. But, I'd be very happy to hear one of those tomorrow to see what we're finding out.

CAPCOM Okay. We'll give you a good one tomorrow.

CAPCOM Okay, Ken. Just at this appearance it appears that everything is swinging along alright with them but we'll have a good scientific readout on it tomorrow.

CASPER Alrighty.

CASPER Hank said something about a - - about the clock update. Are we going to do that tomorrow or tonight?

CAPCOM That'll be done tomorrow Ken. What we'd really like for you to do is get to resting. Go into your sleep period just as soon as you can here.

CASPER Rog, I'm working on the pre-sleep checklist now.

CAPCOM Okay.

CAPCOM Casper, Houston. Would you give us the high gain just as soon as you can and go ACCEPT.

END OF TAPE

CAPCOM Casper, Houston. Would you give us a High Gain just as soon as you can and go ACCEPT?

CAPCOM Okay, Casper, If you'd give us wide-beam width and ACCEPT, please - we're about a minute and a half from LOS.

CASPER Okay, you've got ACCEPT. You want wide in Auto or what (garble)?

CAPCOM Rog. That's wide in Auto, Ken.

CAPCOM Okay. Ken, if you can read, we'd like for you to go back to Block and load your jett monitor routine manually.

PAO This is Apollo Control at 109 hours 2 minutes. We've had loss of radio contact now with Apollo 16 Casper, as the Spacecraft went around the corner on its eighteenth revolution. And when we reacquire in about 45 minutes, Ken Mattingly should either be in his sleep period or about to begin. We last heard from the crew aboard Orion on the lunar surface at 107 hours 53 minutes, or a little over an hour ago, and they should be in the midst of an eight-hour sleep period at this time. We have an additional update to the landing coordinates for Orion based on the crew's out-the-window observations and report of the terrain features that they were able to see out the window. Our best estimate now is that their actual landing site - landing point - is 656 feet west of the target point and 459 feet north. At 109 hours 3 minutes, this is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control Houston at 109 hours 47 minutes into the mission. We have just acquired data on CASPER, now on its 19th revolution around the moon, meanwhile in the Mission Control Center, we have had a shift handover. Flight Director Gene Kranz and his white team of flight controllers now manning the console here in Mission Control. We will leave the line up on this front side pass of CASPER and at 109 hours 48 minutes continuing to monitor, this is Apollo Control Houston.

CAPCOM Go ahead CASPER.

CASPER Houston CASPER

CAPCOM Go ahead CASPER. This is Houston. CASPER Houston, how do you read now.

CASPER Loud and clear, Don.

CAPCOM Okay.

CASPER Okay, I'm ready to give you accept.

CAPCOM Okay, go accept, we're ready to uplink.

CASPER Okay, standing by. And I'd like to verify the cryo configuration with you and make sure that I'm leaving battery A on charge over night. There's no lithium canister change tonight and looks like when you get the uplink in and I give you VERB 74, we'll be through.

CAPCOM I believe that's right. Standby one.

CASPER Houston, we concur with battery A, we'll stay on charge all night. There's no LiOH change and on the cryo configuration, the O2 and H2 tanks 1 and 2 AUTO, tanks 3 off.

CASPER Okay, that's just what we have.

CAPCOM Rog.

PAO This is Apollo Control Houston, 109 hours 53 minutes ground elapsed time. Our CAPCOM here in Mission Control is Astronaut Don Peterson. Meanwhile, Phil Shaffer is heading up the team of flight controllers who are working with CASPER.

END OF TAPE

CAPCOM Casper, Houston. We need an E mod and turn
in for tonight.
CASPER Okay. She's coming at you bit by bit.
CAPCOM Roger.
CAPCOM Okay. Casper, we recommend you go BD roll
and that winds it up.
CASPER Yeah, thank you very much. Okay, Don I
guess that's it. I'll see you folks tomorrow.
CAPCOM Okay, Casper. Pleasant dreams.
CASPER You must know somebody to get a shift like
this.
CAPCOM Say again Casper.
CASPER You must know someboy to end up with a shift
like this.
CAPCOM Ah, I'm afraid you're right.
CASPER Well, have lots of coffee anyhow. Good
night.
CAPCOM Good night.
PAO This is Apollo Control Houston at 110 hours
1 minute ground elapsed time. That - -

END OF TAPE

APOLLO 16, MISSION COMMENTARY, 4-21-72, CST 1:55, GET 110:01 MC406/1

PAO This is Apollo Control Houston at 110
hours 1 minutes ground elapsed time. That was Don Peterson
and Ken Mattingly conversing there. Command module pilot,
Mattingly got his turn in call for the night. However, we
will continue to keep the lines up live in the event we
should hear any further conversations with Ken Mattingly
aboard the command module, CASPER. We're at 110 hours 2
minutes ground elapsed time, this is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control Houston at 110 hours 21 minutes ground elapsed time. The Flight Surgeon here in Mission Control just reported over the Flight Director's loop that Ken Mattingly, aboard the Casper Spacecraft, has just dropped off to sleep. We're at 110 hours 22 minutes into the Mission and continuing to monitor. This is Apollo Control Houston.

END OF TAPE

APOLLO 16, MISSION COMMENTARY, 4-21-72, CST 2:57 GET 111:04 MC 409/1

PAO This is Apollo Control Houston at 111 hours 4 minutes into the mission as the spacecraft CASPER passes above the back side of the Moon on its 19 revolution. We read it's orbital parameters at 67 nautical miles by 53 nautical miles. We're at 111 hours 5 minutes ground elapsed time and this is Apollo Control Houston.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 3:39 GET 111:45 MC 410/1

PAO This is Apollo Control Houston at 111 hours 46 minutes into the Mission of Apollo 16. We are now acquiring data on the Spacecraft Casper as it comes around the front side of the Moon on its 20th revolution. We presently show an orbit for the Command Module Casper of 67 nautical miles by 53 nautical miles. Command Module Pilot Ken Mattingly, like the two Lunar Module Pilots, is in his rest period. We'll stand by, however, and continue to monitor, in the event any conversation should take place. We now show John Young and Charles Duke having 4 hours and 6 minutes of time remaining before their wake-up call. We're at 111 hours 47 minutes, continuing to monitor, and this is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control Houston at 112 hours 42 minutes into the mission. We just picked up a short conversation between Charlie Duke aboard the lunar module ORION, and CAPCOM Don Peterson. We'll play that conversation for you now.

ORION Hello, Houston, ORION. Over.

PETERSON ORION, Houston, go ahead.

ORION A (garble) go we had another MA (garble) (garble) 10 to 15 percent quantity is that what you guys expected?

ORION Okay, if you guys are happy, we'll go back to sleep.

PETERSON Okay, Charlie, we've got one circuit breaker we want you to open. Stand by please.

PETERSON The rendezvous radar operate (garble) 11 row 3 under heaters.

ORION Okay, we got it (garble)

PAO This is Apollo Control Houston 112 hours 44 minutes. That was Charlie Duke aroused briefly from his sleep aboard ORION. He had noted an RCS pressure light on, double checked with mission control to see if the 15 percent was a proper number or an anticipated number. Don Peterson, the CAPCOM, checked with the flight control team here and responded yes it was what we expected. We're at 112 hours 45 minutes into the flight of Apollo 16. We show 3 hours 7 minutes until official time of wakeup for the crew aboard ORIAN and this is Apollo Control Houston, continuing to monitor.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/21/72 CDT 4:38 GET 112:46 MC-412/1

PAO This is Apollo Control Houston at 112 hours
55 minutes into the mission. We've just had loss of signal
with the command module Casper as it passes over the back side
of the Moon on it's 20th revolution. We're at 112 hours 56
minutes and this is Apollo Control Houston.

END OF TAPE

418/1
42A/1.2

APOLLO 16 MISSION COMMENTARY 4-21-72 GET 112:56 CST 4:48 MC-413/1

PAO This is Apollo Control Houston at 113 hours 43 minutes now into the flight of Apollo 16. We're a little over a minute away at this time from acquiring Command Module CASPER on its 21st revolution around the Moon, so at this point, we'll bring the line up live and continue to monitor. This is Apollo Control Houston. We are now receiving data from the spacecraft CASPER.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4-21/72 CST 5:38 GET 113:45 MC-414/1

PAO We are now receiving data from the
Spacecraft Casper. We're at 113 hours 45 minutes ground
elapsed time. This is Apollo Control Houston.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/21/72 MC-415/1

This tape not transcribed. Entire text of tape is repeated on tape 416/1.

APOLLO 16 MISSION COMMENTARY CDT 5:55 GET 114:00 MC-416/1

PAO This is Apollo Control Houston at 114 hours 15 minutes ground elapsed time. At this time I would like to repeat our previous announcement that Flight Director Gene Kranz has just completed a status discussion with flight control team. A first cut preliminary flight plan has emerged. Our present plan is to shoot for the 3 EVA's. Each of about 7 hours duration. EVA 1 is set to start at 119 hours 28 minutes ground elapsed time. EVA 2 start time 141 hours 43 minutes GET. And EVA 3 about 165 hours 30 minutes ground elapsed time. Each of these EVA's would be separated by rest period of 8 hours in essence surface activity would be flopping back to Apollo 15 tight schedule. The traverses for John Young and Charles Duke would be much like the planned pre-mission taking into account the later landing time. If this plan continues to hold good the lunar liftoff will be at 177 hours 28 minutes ground elapsed time. Needless to say the consumables outlook for Apollo 16 is favorable. The closest consumable item aboard Orion is water in the descent system. And this is 5 to 6 hours above the 3 EVA margin and even this could be increased if needed by cutting down electrical power or using from the ascent system to the equivalent of 8 hours. In summary our out look to this point is good. We show our wake up clock in Mission Control shows 1 hour 36 minutes till time of wake up and our ground elapsed time 114 hours 17 minutes. Continuing to monitor this is Apollo Control Houston.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4-21-72 GET 114:19 CST 6:13 MC-417/1

PAO This is Apollo Control Houston at 114 hours
56 minutes into the flight of Apollo 16. We've had loss of
signal with the Command Module CASPER as it crosses over the
back side of the Moon on its 21st revolution. At 114 hours and
56 minutes, this is Apollo Control Houston.

END OF TAPE

ORION (garble) cheerup. Did you guys have a site handover about 20 minutes ago?

CAPCOM Hold on I'll check. Okay yes I guess we did. Why did you get King there?

ORION Okay you (garble). While you've got the uplink a little bit drop the uplink and a big blast of static and that's why I picked up the EKG -- and that's why I picked up EKG about 20 minutes ago.

CAPCOM Okay. The docs' over here say yes you did.

ORION Yes, okay. Let me give you -- standby.

ORION Okay, Tony, if you're ready for the crew status report I'll give it to you.

CAPCOM Okay we're ready, go ahead.

PAO That's Charlie Duke talking to Mission Control from the Lunar Module Orion.

ORION (garble) did not eating the rye bread. Ate everything else and add a food stick into that also. For my meal I ate everything but the rye bread and add a drink bag and a food stick. That's the EVA beverage, add that and the food stick. From that occasion John had none and he got 7-1/2 hours of good sleep and for me I had a second all and I slept for about 6-1/2 to 7 hours, I think, and it was real good, over.

CAPCOM Okay we copy that. Sound real fine. You mean you got John to eat one of those food sticks?

ORION Believe it or not.

CAPCOM Outstanding.

PAO That's Tony England manning the CAPCOM position in Mission Control at this time speaking with Orion.

ORION (garble) in the -- we just had -- I just woke him up just a second ago, as a matter of fact. I couldn't stand it any longer.

CAPCOM Very good. Now you're right on the time line it's wake up time.

ORION Houston we're ready to copy our lift-off times, over.

CAPCOM Okay standby one.

CAPCOM Okay Charlie we've got the flight data for the LM liftoff, LM (garble).

ORION (garble).

CAPCOM Okay. T22, 16T, 29, 51, T23, 118, 28, 22, T24, 120, 26, 55, T25, 122, 25, 28, T26, 22, 24, 00, T27, 126, 22, 32. This assumes GT update of 001148 and Ken will be getting that update in about 2 hours.

ORION Okay. Understand starting with the 22, 116 plus 29 plus 51, 118 plus 28 plus 22, 120 plus 26 plus 55, 122 plus 25 plus 28, 124 plus 24 plus 00, 126 plus 22

ORION plus 32 and then assume the GET update
of 11 minutes and 48 seconds for Casper, over.

CAPCOM Okay that's a good readback and we have
an update to your Lunar surface checklist.

ORION Go ahead.

CAPCOM Okay on 11-1.

ORION Go ahead.

CAPCOM Okay I guess we were too quick last night
in crossing out that PRO, hold until standby light off. We'd
like you to put that back in.

ORION Okay. Don't worry we'd of done that.

Thank you much.

CAPCOM Okay on page 11-2.

ORION Standby.

CAPCOM Okay.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/21/72 7:51CST 115:58GET 420/1

ORION Go ahead.

CAPCOM Okay, under that PSM there is update. We'd like to have the note.

CAPCOM PSM rest should be used only in the event of LGP flash PMC clock sync is required. And when it registers R1 0011 R2 133 46 R3 256 21.

ORION Okay, say R1 and R2 again.

ORION Okay, R1 00011 R2 133 46.

ORION Okay, mode is PSM VERB to be used only in event of LDC PMC clock sync R1 0011 R2 133 46 R3 256 21 and that's what we got loaded or is that what we've loaded this morning to sync up.

ORION Okay, that's what you'd have to load the sync up after they fix the PSM time.

ORION Okay, thank you much.

ORION Okay, and that's the end of that and I'll brief you on the traverse whenever you are ready.

ORION Let John get on the COMM. It'll be a couple of minutes before the eat period. We'll give you a call while we're eating.

CAPCOM All right.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 7:57 GET 116:03 421/1

PAO This is Apollo Control, Houston, at 1116 hours 7 minutes into the flight of Apollo 16. As you've heard, the crew aboard Orion are now awake and CAPCOM Tony England in Mission Control has had some conversations and passed up some pad data to lunar module pilot Charlie Duke. Meanwhile, in the Mission Control Center, the flight planners are pressing ahead further in this activity, and also, refining the flight plan itself. We now show the transearth injection burn at a time of 222 hours 21 minutes ground elapsed time. We're at 116 hours 7 minutes continuing to monitor, this is Apollo Control, Houston.

END OF TAPE

ORION Hello, Houston. Good morning.
CAPCOM Good morning, John.
ORION You worked all night, Houston?
CAPCOM No, no. I went home and sacked out.
ORION Good. Okay. Go ahead with your EVA stuff.
CAPCOM Okay. Now these are the backroom's best
guess. That Spook sampling maybe compromised by that ray
from South Ray that you described, but since we're mostly
interested in local feeling on EVA-1, you'd probably have
to spend a little time trying to differentiate between second-
aries coming in from South Ray and local material. You
described most of the Ray material as being very angular.
One or two may be rounded blocks for local material. At Flag
again, you may have the same problem since (garble) over
there, we really couldn't tell and we don't want you to feel
bound to Plum Crater there at Flag; if there's another place
on the rim of Flag where you're more likely to get local material,
feel free to head for it.
ORION Okay, we'll do the propellar and the Ray
will be a pretty good job, if it's all right.
CAPCOM All right and there's the (garble).
ORION (garble).
CAPCOM I'm sorry, John, go ahead.
ORION It sure looked all right at pitch over
there.
CAPCOM Right. And I guess we'd like you to go
ahead on a normal EVA-1 there and not worry too much about the
local blocks in the LM ALSEP area, we'll try to pick them
up at the end of the EVA-1 or at station 10 in EVA-2.
ORION Roger.
CAPCOM And again, on the traverse, itself, we'll
skip the TV getting out, since we won't have AC and all and high
gain, and so you don't have to worry about deploying the TV
and tripod and we'll leave the TV for Charlie when he gets
the LCRU out. We will need a few more words during the ALSEP
deploy or, correction - during the LRV deploy, since we won't be
able to watch it. And our best guess on the ALSEP area is
still sort of northwest of you there, but it will be completely
up to you whatever looks best. And again, on the use of the UV
camera will - we'll give you real time update from it.
ORION Okay. I guess we're going to have to put
the UV a little closer to the vehicle because of the current
(garble). Probably won't make a lot of difference there.
CAPCOM Okay. And if you guys are all for it and
everything, we're still trying to crowd in the EVA's.
ORION What do you mean, are we all for it?
CAPCOM Well, I just thought I'd give you a chance

CAPCOM to put your vote in.
ORION I'm not for crowding them in, but let's
do three of 'em!
ORION Tony, Charlie, please pass on to the
ALFMED PI the sun proves that you can see those light flashes
on the lunar surface just like translunar code and you can
also see into lunar orbit in weightless periods. Over
CAPCOM Okay, did you notice any change in frequency?
ORION They're about the same as the (garble)
experiment we ran, but they were about the same as they were
in lunar orbit.
CAPCOM Okay, understand, they were less than in
the experiment but about the same as in orbit.
ORION Yeah, and I think there was about, let me
say I maybe saw 10 before I went to sleep and I think I got
to sleep pretty fast so, they aren't really too numerous, but
you can see them.
CAPCOM Okay, very good.

END OF TAPE

PAO This is Apollo Control Houston at 116 hours 42 minutes into the flight of Apollo 16. we've not heard for awhile from Lunar Module Pilot Charles Duke or Commander John Young, aboard Orion. Apparently, the 2 crewmembers are having breakfast. One correction to an earlier number, we identified 222 hours -

ORION I think we're down to 117 03. What time have you got?

CAPCOM I'm sorry, John. Say again?

ORION I say, we're down to 117 hours and 3 minutes, we're ready to don suits, what time have you got?

CAPCOM 116 42.

ORION Okay, we're going to go ahead and do it. Understand that when we get it on and get the PLSS on we'll dress and go ahead and get out cause we don't have a very good way to keep time in here.

CAPCOM Okay, understand. We do have a procedure here, we'd like you to mess with your steerable antenna a little bit, though.

ORION Okay, do you want to do that now?

CAPCOM If you're ready.

ORION We're ready.

CAPCOM Okay, circuit breaker panel 11 AC BUS B

S-band antenna CLOSED.

ORION It's CLOSED

CAPCOM Okay, panel 16 on the comm, S-band antenna CLOSED.

ORION CLOSED.

CAPCOM Displays, CLOSED.

ORION Displays CLOSED and meter S-band antenna CLOSED..

ORION S-band antenna heater breaker CLOSED.

CAPCOM Okay, on the steerable manual controls match the indicated angles.

ORION Okay.

CAPCOM Okay, the track mode to slew.

ORION Track mode to slew.

CAPCOM Stand by a second, please.

PAO The 221 hours or 222 hours 21 minutes was based on a nominal flight plan TEI. Our present plan, however, is based on a 1 day early return and this would be 204 hours 30 minutes for the transearth injection.

ORION Watch it, John, I just got a jump on my needle here, on the audio.

ORION Yes.

ORION It's always been stuck on 12 before and now it's on minus 75.

ORION But it doesn't look like it's 75 out there, of course you don't know with the PITCH.

ORION Okay, what do you want to do with it now, Houston?

CAPCOM Stand by 1 on that. We're working on another problem here.

ORION (garble) Working another problem.

CAPCOM Okay, we'd like you to close inverter 2 circuit breaker and select inverter 2.

ORION Okay, you got it? That's what I was afraid of. Now it's back to 12.

CAPCOM Okay, we'll start drawing a procedure here. We had the track mode to slew, set the PITCH control knob to fully counter clockwise.

ORION It is.

CAPCOM Okay, track mode OFF.

ORION It's OFF.

CAPCOM Okay, now set both PITCH and YAW knobs fully clockwise.

ORION It is.

CAPCOM Okay, go to track mode slew.

ORION Okay. And the antenna didn't move.

CAPCOM Okay, we understand, it did not move.

ORION Negative, either in pitch or yaw.

CAPCOM Okay, look on your panel 16, and see if the S-band antenna circuit breaker is open or closed.

ORION It's closed.

ORION What a bunch of bullshit.

ORION (garble)

CAPCOM Okay, we're just going to back out of that procedure. Let's go track mode off.

ORION (garble) Charlie.

CAPCOM And match indicator to angles and start the mode circuit slew.

ORION Tony, with the track mode to off, both indicators are minus 75.

CAPCOM Okay. Okay, set your pitch at 180 and YAW at minus 12.

ORION It's set.

CAPCOM Okay, and go through and we'll pull the circuit breakers that you set for this procedure that's on panel 11, S-band antenna closed, pull it open.

ORION Okay, it's open.

CAPCOM Okay, on 16, S-band antenna open.

ORION Say, Tony.

CAPCOM Okay, John.

ORION Go ahead.

CAPCOM Okay, the S-band antenna open.

ORION Go ahead.

CAPCOM Okay, displays open, and the heaters open.

ORION It's open.
CAPCOM Okay, inverter 2, circuit breaker open,
and inverter 2 off.
ORION Rog. That's done.
CAPCOM Okay, let's press on with your suits.
ORION Okay, Tony. What are the nominal
angles for lock on air and on this attitude?
CAPCOM I'll get those.
ORION Okay. (garble)
CAPCOM Okay, the 180 and minus 12 we gave you
should be a good angle. And that's for photography, not
for lock on. We're going to have you take a picture of
it when you get out.
ORION Roger. When Charlie moves the needles
in YAW, he can get it to oscillate it in plus.
ORION Plus or minus what?
ORION Plus or minus 3 degrees. The antenna
doesn't sound like it's moving. It sort of sounded jiggly.
ORION What are you doing now, Charlie?

END OF TAPE

CAPCOM Okay, John and Charlie, we'd like you to press on with the EVA work -- if we mess with that S-band anymore, we'd do after the EVA. I've got a note here; I don't know whether it's right or not but it says that you won't be able to hear the yaw motor.

ORION Okay, but Charlie is looking at it out the window and it's not moving.

CAPCOM Okay, there's a latching mechanism in the thing there that should have released when the thing was unstowed and we're going to try to have you take a picture of it because a lot of it polks out there and we can tell from the picture whether that latch released and there should be a little bit of slop in there so --

ORION I understand.

CAPCOM Maybe you could drive it a little bit.

ORION Okay, one copy check, we're ready.

ORION (garble).

ORION Okay.

ORION (garble) (Heavy background).

ORION (garble) (Heavy background).

ORION You should see me hold up this stitch without breaking move with one hand while Charlie is unzipping it with one hand. That's really neat.

CAPCOM Right. Bring some of that 1 stretch G back here.

ORION Yeah. You earth people don't know how nice this is.

ORION Got it.

ORION Where are we going to stow them?

ORION (garble) (Heavy background).

ORION (garble) first.

ORION Got to put these (garble) in first.

CAPCOM Put your flashlight in first.

ORION Yes (garble).

ORION We already got down here this morning (garble) (garble).

CAPCOM Yeah, how about this other problem?

ORION (garble).

CAPCOM Charlie, Houston.

ORION Charlie is putting on his suit. I'll talk to you.

CAPCOM Okay. If it's not too late on Charlie's helmet there, there's a few people that just want to make sure they washed it out with water to get that orange juice out before he puts that anti-fogging stuff in there.

ORION It's never too late to do something like that. We'll do it.

CAPCOM Okay.

ORION You could've done it last night, you ass hole.

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ORION They want you to wash it off with water
before you any anti-fogging in there.

ORION Huh?

CAPCOM Roger, John, we copy that.

ORION What did I say?

CAPCOM Roger, we're just giving you a hot night.

ORION Are we on mike?

CAPCOM Yes, you sure are.

ORION (garble).

END OF TAPE

ORION GARBLE (background noise). Want to do it
to save time.
ORION Do you want to be in down voice or do you
want to go normal voice?
CAPCOM Standby 1.
ORION GARBLE. (Background noise).
ORION Isn't going to be very long.
PAO This is Apollo Control Houston 117 hours
4 minutes since liftoff. The crew aboard ORION, John Young,
Charles Duke proceeding with their EVA preparations. Meanwhile
in the Mission Control Center here in Houston detailed planning
for the first 2 EVA's is in progress. Consumables will be
closely observed during this period and leaving the third EVA
as an open option but at the same time aiming toward that
possibility. We're at 117 hours 5 minutes ground elapsed
time and this is Apollo Control Houston.
ORION 2 and 4 ones.
CAPCOM Okay, 2 and 4 ones.
ORION My entire pitch 5 pounds you're (GARBLE).
ORION Heavy background noise (GARBLE). Go to the
old GARBLE.
ORION All right.
CAPCOM Orion, Houston.
ORION Go ahead.
CAPCOM Verify aft OMNI.
ORION Aft OMNI Charlie.
ORION We're on aft OMNI.
CAPCOM Okay.
ORION You're GARBLE, really bad. Right there.
GARBLE. It's where the GARBLE dips up GARBLE.
ORION Okay, right now and -
ORION Charlie could you straighten up a little I
can't - GARBLE.

END OF TAPE

ORION You're a good boy, Charlie, you can go for it now.

ORION Okay, got it. That's it. Okay. Okay. Pull it through this. Now.

ORION Got it. Ha! Ha! Ha! Well, here we go (garble). There is just no way for a human being to get this crinkle out of there because he ain't got three hands - four hands does a good job. One to pull up a zipper and two to hold the crinkle, or three hands.

CAPCOM Orion, Houston.

ORION Go ahead.

CAPCOM At your convenience we'd like you to switch lile canisters and jettison to use them.

ORION Okay. You want to switch the lile canisters unit.

CAPCOM And we have some changes to your surface checklist and your EVA cue pack.

ORION No, but they go in - report Charlie.

ORION Okay, and leave the bracket for the canister.

ORION Understand, leave the brackets for the LOI canister.

CAPCOM That's affirmative.

ORION Okay, go ahead with the changes.

CAPCOM Okay, on your EVA 1 cue card.

ORION Go ahead.

CAPCOM Okay, on EVA 1 PREP - right hand column 3rd line it says COMM modulate FM.

ORION EVA 1 prep right hand column. Okay, modulate FM. Do you want to change it too?

CAPCOM Right, we want to delete the modulate FM and delete power amplifier primary.

ORION Okay.

CAPCOM Okay, about halfway down that column under COMM it said telemetry biomed off?

ORION Yep.

CAPCOM Okay, delete that telemetry BIOMED OFF and 2 items later it says recorder on - delete that line also.

ORION Okay. What else.

CAPCOM Okay, standby a second.

ORION (Garble) Yeah, that's right they are hard to beat. (Garble) No, they want to do it now. Okay, Houston we're in secondary. On that LOH jazz, Charlie is changing it now.

CAPCOM Okay.

ORION Weaken it, Charlie, there is too much (garble). What (garble) comm you got?

CAPCOM Okay, John on the backside of that EVA 1 and the EVA post -

ORION Okay.

CAPCOM Okay, it's on the bottom half of the card, left hand column, third line up - it says telemetry biomed left

ORION Okay.
CAPCOM Delete that line.
ORION Okay.
CAPCOM Okay, go to your surplus check list, page
3-4.
ORION Verb and checklist page 3-4. Go ahead.
CAPCOM Standby one. Okay, left hand column near
the bottom of the page it says on Houston gear telemetry,
PCM low, delete that line. And delete the next line S-band
voice downvoice backup, delete that also.
ORION I wasn't going to stick it in there until
you got that thing sharp. Okay.
CAPCOM Okay, John, we've got very poor comm, we're
going to have to drop the link for a minute here, we'll be back
in a minute.
ORION Okay, I missed all you said about that
page 3-4. Do you read me?
CAPCOM Rog, I just now - I'll come back to you in
a minute with 3-4 again.
ORION Okay, philosophically speaking I would like
to get all these changes in before one or the other of us puts
on a pressure suit because we're in energy conservation mode
of operation now and I'd like to keep it that way.
CAPCOM Right, I sure do agree with you John.
ORION Okay. Okay, Houston the LOI canister GARBLE
we're back on the primary.
CAPCOM Okay, we copy.
ORION Okay, John has got his suit on and he's all
laced up. He's got a shot of water.
CAPCOM Very good.
ORION That was good, how I know it. What to go
ahead with the checklist changes or you want to - me to don my
suit.
CAPCOM I'm trying to get an answer here.

END OF TAPE

ORION Coming in?

ORION (garble)

CAPCOM (garble)

ORION (garble)

PAO This is Apollo Control, Houston, at 117 hours 23 minutes since liftoff. The crew aboard Orion moving forward in their EVA preparations. Meanwhile, in the Mission Control Center, a shift turnover is in progress. Pete Frank's Orange Team of flight controllers in the process of taking over.

CAPCOM Okay, on page 3-4, the bottom left-hand two lines, palametry TCM low and S-band voice downvoice backup, delete both lines. Okay, on the right-hand column, of 3-4, the third line from the bottom, it says cabin gas or turn auto, change that to open. Did you get that Charlie?

ORION I copy.

CAPCOM Okay, on page 3-6, the fifth line from the bottom on the left-hand column. It says cabin gas or turn auto change that to open also.

ORION Okay, Tony.

CAPCOM Okay, we got it for now. Later on, we'll have to change the cue cards for EVA-2 and 3 but that's the extend of the checklist change. We've got one note for you. We're going to have a change to the material -- to the gear that you bring up during the transfer on the EVA-1 and I'll catch you before you go up and remind you about it.

ORION Okay. (garble) later.

CAPCOM Okay, good show.

PAO This is Apollo Control, Houston, 117 hours 25 minutes ground elapsed time. Following the shift change, there will be no change of shift briefing. I repeat there will be no change of shift briefing.

ORION (garble) I hope I never have to do that.

ORION (garble) over there.

ORION (garble).

ORION Okay, (garble) first.

ORION It's bigger than me.

ORION You mean it's bigger than I am.

ORION Okay.

ORION Okay, Houston, (garble) off comm.

ORION (garble)

CAPCOM Charlie, you're very weak. Say again.

END OF TAPE

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ORION Make it (garbled and heavy background noise).
ORION Okay, Houston.
ORION (Heavy background noise.)
ORION Houston, how do you read, over?
CAPCOM Orion, Houston. Go ahead.
ORION Ken's been trying to (garbled and heavy back-
ground noise). Okay, (garbled).
CAPCOM You're very weak, Charlie.
ORION How's that.
CAPCOM You're still weak. I think we can copy you
though.
ORION Okay, look. We're going to probably have
some trouble with the comm here, Hank. Are you sure you want
to stay in (garble) or just exactly what. We're ready to go into
the (garble) the lunar S-band (garbled and heavy background noise).
CAPCOM Okay, we think this is the system with the
best signal margin, I guess we'll have to stay with it.
ORION Okay, you'd better think about the (garble)
comm then and we're thinking maybe we could sort of go with (garble)
you guys when we get out on the surface.
CAPCOM Right. How are you coping us, Charlie.
ORION You're loud and clear, Tony.
CAPCOM Okay.
ORION (garbled)
ORION (Garbled and heavy background noise.)
CAPCOM And Charlie, we would like to remind you to
dry out your helmet pretty good before you put that anti-fog on.
ORION (garbled)
ORION This is Charlie. You want to check the OPS
right?
ORION Okay, Charlie. You've got 6 thousand pounds
of thrust pressures. (garbled)
ORION I don't see it makes any difference. In one
way or the other you'd get out, it's going to be cluttered.
Right.
ORION There you go, Charlie.
CAPCOM Okay, Orion. We're going to have a site hand
over, and maybe our comm will get a little bit better.
ORION Okay. Hey, and look what I forgot to do.
Idiot. Charlie see if you can (garbled).

END OF TAPE

ORION (garble)
CAPCOM Orion, Houston, We'd like to try the
normal voice and maybe it'll help.
CAPCOM Orion, Houston, how do you copy us?
ORION Loud and clear.
CAPCOM Now, we can hear you down there, but you
are too weak to use. Standby one. We're going to go back
to downvoice backup.
ORION (garble) Have to.
ORION (garble) Charlie.
ORION Houston, Orion (garble) how do you read?
CAPCOM Now, you're very weak there, Charlie.
We'll have to press with it this way.
ORION (garble).
ORION Okay, Charlie, (garble).
ORION Okay. (garble) Heavy background. (garble)
check for (garble).
ORION I don't understand that (garble).
ORION What are you doing?
ORION (garble)
ORION Okay.
ORION Yeah, we're out of seat but you are sup-
pose to be going back up there.
ORION I'm what?
ORION (garble) into this thing?
ORION Okay. (garble) and then go right on to
barber.
ORION Okay.
ORION Two up.
ORION I'm sorry Charlie. Haste makes waste.
ORION Look like it's on, Charlie.
ORION Okay.
ORION Charlie, you got a hold of a foot some
way.
ORION Okay. There we go.
ORION (garble).
ORION See what happens, Charlie (garble).
ORION Okay.
ORION Got it.
ORION (garble).
ORION Okay. (garble).
ORION Okay.
ORION (garble)
ORION (garble) spacecraft hoses or keep the water.
ORION Let's go on spacecraft hoses. Okay.
ORION So do I.
ORION Why don't we run the water?
ORION Man, it don't take long.

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ORION
ORION

Okay.
Okay, (garble)

END OF TAPE

ORION Okay, that's good. (garble)
ORION Okay, Tony, we're down to the (garble)
CAPCOM Charlie, this is Houston. We're having
a hard time copying you. John's a little bit better there.
Would you check that your mikes are up to your mouths or have
John say it?
ORION (garble) Our mike is up to our mouths
now.
CAPCOM Okay, that's a little better.
ORION Okay.
ORION Tony, how are we doing on time?
CAPCOM Looks like you're a little bit ahead right
now.
ORION Okay.
CAPCOM Your comm check should come in about
25 minutes.
ORION Okay, we don't really have a feeling for
that. He's probably got a watch here, but we're not able to
watch it.
CAPCOM Roger. Understand that. When you get
the chance, we'd like to put the lunar battery on the LMP bus.
ORION Understand. Lunar bat on the LM bus.
CAPCOM Right. If you want, I'll just read the
procedures.
ORION Okay, go.
CAPCOM Okay, the steps we've got here are bat 2,
3 zips, talk back barber pole, bat L, LMP ON, talk back LMP,
bat 1 OFF RESET, talk back barber pole.
ORION Charlie says that was OFF power on the
Commanders bus. It probably won't hurt anything.
CAPCOM Okay.
ORION Is that okay with you guys to do that?
ORION What are you hitting there, Charlie?
ORION (garble)
ORION Okay - how come you're not talking to them?
ORION Can you hear me?
CAPCOM Well, Charlie, we're just not reading you
well enough to understand what you're saying there.
ORION How?
ORION How do you read now Tony?
CAPCOM I can hear you Charlie, cause I know what
you're saying, but if you say anything different, I'm sure I
wouldn't be able to copy.
ORION Let me cover up my mike. How do you read
now Tony?
CAPCOM About the same.
ORION Do I sound pretty bad too, Tony?
CAPCOM Say again, John?
ORION Say again, John.

ORION Do I sound pretty bad? I must. What we're trying to find out is if we have a comm problem before we start getting into this any further.

CAPCOM Alright, we understand. Would you verify that you've done the battery management on 3-9.

ORION You did the battery management, right?

ORION Yes, I'm done.

ORION That's completed, Houston.

ORION Close that bag. Here we've got (garble)

ORION Are you going to leave the bag?

ORION Yes. (garble) I'm just going to leave the bag. (garble)

ORION Houston, do you read 4 in OMNI any better. Over.

CAPCOM Stand by 1.

ORION (garble)

CAPCOM Okay, Charlie. I guess we'd like you to go back to F.

ORION They want you to go to F, Charlie.

ORION Okay, I'm F OMNI now. Okay. It must have unlocked Charlie.

PAO This is Apollo Control at 118 hours 2 minutes. We expect we're probably going to have to live with our rather marginal communications during the time that the comm is coming to us through the LM omni directional antennas. Of course, we've had a problem with the Lunar Module steerable antenna. We're not able to use that. This is the larger high gain antenna, which we would normally use on the lunar surface. At the present time our ground station is Madrid, Spain, which has an 85 foot antenna, and the feeling from our communications engineer is that this is probably about as good as the communications will be until the crew gets out, gets the lunar communications relay unit in operation at which time we should see a rather dramatic improvement in the communications.

ORION If we can get it open. You don't get the handle all the way open. It'll never come any further than this Charlie.

ORION That's unlocked right there.

END OF TAPE

ORION Roger. Move that cam.
ORION (Garble) (Heavy background noise)
ORION All right. Okay. All right. Yaw is good.
ORION What is this thing around the backup, Charlie?
It's sort of shallow water.
ORION Yeah.
ORION Roll Charlie. Roll the water (garble).
ORION Okay, PLSS water connection is off. This
drip battery is locked. Banning cable is locked. Antenna is
locked. (Garble) Make it (garble).
ORION (Garble). Okay. (Garble) burn in, rog?
(Garble) (background noise). (Garble) around that way, Gerry.
Okay. There we go. Okay. Hoses are above the bort strap.
ORION (Garble) Okay. (Garble) All set.
Go.

PAO This is Apollo Control at 118 hours 8 minutes
and it appears to us that the crew is pretty much on their
EVA preparation timeline. They are making about the progress
we would expect and it looks as if at this point that they will
be fairly close to starting EVA 1 at about 119 hours, 20 minutes.
We'll continue to follow their progress and give you an update
on that for once.

ORION Okay, Charlie, there's off, off, trump is
off. Pump is off.

ORION Okay. Oh, look at that. (Garble)
ORION Houston, what site have you got on that -
8500.

CAPCOM Charlie, I can hear you talking, but I can't
copy it.

ORION Can you hear me, Tony?
CAPCOM Yes, John I can, if you talk slowly and
right into the mike.

ORION Okay, that's what I'm doing.

CAPCOM Okay.

ORION Charlie's got his PLSS on.

ORION Okay, Tony (garble) I've got my PLSS on. Over.

CAPCOM Very good, we copy that Charlie.

PAO This is Apollo Control that last report from
Charlie Duke indicates that he has his portable life support
system, the backpack that supplies oxygen and cooling water,
removes the carbon dioxide from the suit loop on. John Young
at this point is suited and is beginning to get into his
portable life support system.

END OF TAPE

ORION Okay, the battery is in and locked.
The battery is locked. Controls are all off. The (garble)
is locked. The controls are clear and the hose is locked.

ORION See how that thing takes a set fold
it up in there (garble) right there Charlie. (garble) behind
you (garble). What? (garble) Charlie. He didn't believe it.
Here let me take that thing off. Turn around this way. Can
you turn around this way? Okay, turn around this way. We'll
see. Yes. Yes. How are you doing? Okay. Yes right here.
Okay. Okay. How about another shot, Charlie. Okay. That's
good. Okay, can you get my hose? Got it right here. Okay.
There's one little (garble), Charlie. Okay plus DELTA.
Did we have our radar standby breaker in or out, Houston?

CAPCOM Say again, John.

ORION Should the radar standby breaker be in or
out?

CAPCOM Okay, we'll check.

ORION Okay, Tony, we are starting the plant
COM check momentarily, over.

CAPCOM Okay, you're very weak but readable,
Charlie.

ORION Okay (garble) mode S-band to BR, ICS to TR.

PAO This is Apollo Control. The procedure
the crew is going through at the moment is the Lunar Module
Communications Check. They'll go through the various communi-
cations modes to see that all are functioning. As we've
said previously we expect the communications to be rather
difficult until we get the Lunar communications relay unit
in operation with its high gain antenna and its wide band
antenna, at which point we would expect to see a rather
significant improvement in the communications. That piece
of equipment should be brought into operation a little over
an hour after beginning the EVA.

ORION the EVA.

CAPCOM And Charlie we'd like that radar standby
breaker closed.

ORION Okay it's closed. EVA uplink (garble)
and able. Better mark those off. Can't reach it. Uplink
(garble) and Able. Okay. S-band -- my S-band's VR, ICS to
VR, relay to off, (garble) MATCH A to ZR, received. Okay.
Middle lock. Okay. (garble) audio breakers closed. Okay
going to A. (garble) get a turn-on of S-flag G, a
press flag 0, an 02 momentary a PLSS 02 pressure gauge graded
at 85 percent. Check with B&U.

END OF TAPE

ORION Charlie, I don't read you.
ORION Gosh!
ORION Houston, now do you read you LSD.
CAPCOM Charlie, we hear you. You have a squeal in
the background there.
ORION Yea, I know. How do you read now, over.
ORION Can you read anything?
CAPCOM Now we're coping you Charlie, I didn't hear
the squeal that time though.
ORION Over. I know what it is. (garble) Okay.
Your not keying it at all.
ORION Houston, am I keying over?
ORION You are now.
CAPCOM Yes, you are Charlie. How do you copy us.
You sound better than you did on LM comm.
ORION (garbled)
PAO This is Apollo Control at 118 hours 25 minutes.
The crew onboard Orion, at the present time is going through the
check list prior to depressurizing their cabin, and they appear
to be pretty much on the revised flight plan, which would have
them coming out on the lunar module at about 119 hours 20 minutes.
ORION I cleaned them out and I think I'm okay now.
ORION (garbled)
CAPCOM Okay, we copy that, Charlie.
ORION I can't help it.
ORION They said they copied that, John.
ORION Oh.
ORION Nothing we can do about it now.
ORION Okay.
ORION Okay, we read.
ORION Okay.
ORION CB 11 command audio open.
ORION Okay, command audio's open
ORION Mode, Charlie, your breaker. VHF A to off,
and B to off. PLSS CTT to maintain.
ORION Right.
ORION We go to B.
ORION There's B.
ORION We have a (garble) and a PLSS tag, to PLSS 02.
NOUN 85.
ORION Okay. (garble) PLSS 02 (garble) are 98.
ORION (Garbled and heavy background noise.)
CAPCOM Say again, Charlie.
ORION (Garbled and heavy background noise.)
CAPCOM All we're coping you, but you're weak.
ORION Okay. We're reading you 5 - 5. We're in
transmode.
ORION (garble)

ORION Comm check with the LMP in. You do the comm
check now.

ORION Hello, Houston. How do you read, over.

CAPCOM Okay, John. You sound good but again your
weak also.

ORION Okay, I'm hollering as loud as I can. And
my microphones are right in my mouth.

CAPCOM Right, I can hear it bouncing against your
tensiles.

ORION Okay. We'll switch over into AR now.

ORION How now, Houston.

CAPCOM Okay, just like before.

ORION Do you read, Charlie.

ORION Okay, Houston. Your coming in beautifully,
Tony. 5 - 5.

CAPCOM Very good. Actually your comm is better now
than for both of you than it was when it was on the LM.

ORION Okay, great. Okay.

ORION Okay.

ORION Okay, Houston. My 02 (garble).

ORION So is mine. About 99.

ORION (garble)

CAPCOM Okay, we copy that.

ORION Okay. (garble)

ORION Okay. S-band mode mark TM. Go.

PAO This is Apollo Control. The crew continuing
with their communications checks. At the present time they are
using the communications system in their portable life support
system, the back pack, and it's being relayed to us from the
back pack through the LM communications system. And our estimate
now on the begining of the first EVA is that they could make it
about 15 minutes early if they continue at the pace they are
going now. That would put them out of the lunar module at about
119 hours 5 minutes.

CAPCOM Okay, we don't expect it till you get on the
(garble).

ORION Okay, fine.

ORION Okay. Toll as required. Circuit breaker 16
cabin VCS repress closed.

ORION Go.

ORION Repress closed, verify. We'll stay in Delta
B to open.

ORION Go.

ORION S-band Delta B number 2. (garble)

ORION S-band 2.

ORION S-band 2 open.

ORION Okay. Switch band selector to 2.

ORION Stand by ECS caution and order step lights
comr on in about a minute.

ORION Okay.

ORION (garbled) to EGRES, standby.
ORION Go.
ORION (garble) gas return to EGRESS, standby.
ORION Go.
ORION Suit circuit released to auto, verify.
ORION Go.
ORION Okay. Your 102 hours OPS a minute. LMP
first, suit isolation valve actuate (garble). Their both up,
okay, let me connect your OPS off. (garble)
ORION Fine, and you.
ORION Yea.
ORION There's a SET light.
ORION Okay.
ORION There's a SET light, Houston.
ORION (Garbled and heavy background noise.)
PAO The crew at the present time is, their getting
into their oxygen pert systems, the backup oxygen supply that
they carry on top of their back pack. Following that, they will
be putting on helmets and gloves and getting set to begin depres-
surizing the cabin after a series of checks there.
ORION (garble)
PAO A few moments ago, Charlie Duke asked about
television. We passed the word up that we do not expect television
until they get the lunar communications relay unit in operation.

END OF TAPE

ORION (garble) lock.
ORION Okay, now we're receiving.
ORION Okay.
ORION John, why don't you sack us some water.
We still (garble) to go.
ORION Okay, just a minute.
ORION (garble) you might get Charlie.
CAPCOM How's that?
ORION That's better.
ORION Okay.
ORION Okay.
ORION Got it?
ORION No.
ORION (garble)
ORION (garble) lock 30.
ORION (garble). And I'll get us a cool one.
ORION Okay.
CAPCOM That's pretty smart, Charlie.
ORION Brace this here for a little bit.
ORION All right.
ORION Man, you're doing it.
ORION Okay.
ORION Okay, I'm turning off the water.
ORION Okay.
CAPCOM Let's see if we could still do that, let's
do that (garble). Let's keep doing that 'till we get down here.
ORION Okay, PLISS fan is on, position MIC.
ORION Okay, (garble) is clear.
ORION That has it Jim.
ORION Don helmet, check flight bag position
(garble) visor (garble).
ORION (garble) helmet to the very back.
ORION Can you get it Charlie?
ORION (garble) here John.
ORION Let me try to get it on where -- try to
get it on whenever you get it down. I can see it. Oh, man,
that's going to with it (garble).
ORION Give it a try.
ORION (garble).
ORION (garble).
ORION Make sure the (garble) goes down all the
way to the back here.
ORION This should be effective.
ORION But it feels like right over there.
ORION Same place as yesterday (garble).
ORION Yeah. (garble).
ORION (garble)
ORION Let me put it on for you. I can see what

ORION you --
ORION Okay.
ORION Just hold your head back. Get it over
your head first. Watch out for the mike.
ORION Yeah, get that end tied.
ORION Now why don't you try it, John.
ORION Okay now we don the leaver.
ORION Okay going to (garble).
ORION I'll put yours on first.
ORION Careful we don't drop this glove.
ORION Yeah, I know it we'd be (garble).
CAPCOM (garble).
ORION That looks pretty good, John.
ORION Okay.
ORION Get it back on back?
ORION It is (garble).
ORION (garble) get mine out?
ORION (garble)
ORION All righty.
ORION (garble) got it, Charlie.
ORION You're a little top heavy with the PLSS,
aren't you?
ORION I feel a little bit --
ORION (garble)
ORION (garble)
ORION Okay.
ORION Turn around.
ORION Man, is that water cold! Ooh, ooh. Feels
good don't it?
ORION Hey, can you get my tool harness straps?
ORION There's one.
ORION Okay.
ORION Want me to get the other one?
ORION Okay.
ORION Got it.
ORION Okay. Hold on. Got this one?
ORION (garble). Down.
ORION See the other one?
ORION (garble)
ORION Okay, SCG we got that and we're open to
(garble) and we can disconnect the hoses and then connect up
the PLSS hoses.
ORION Okay.
CAPCOM Okay, the pump is open.
ORION Okay.
ORION (garble) got yours, huh.

ORION Yeah.
ORION Throw that backup in there (garble).
ORION That's all right. It won't bother you
would it?
ORION No.
ORION Is yours? Well, put it back there on the
wall.
ORION Yeah. I am.
ORION Okay, it's on the wall.
ORION An extra four inches on this hose.
ORION Super, push.
ORION Okay, 10 minutes.
ORION Guess what?
ORION Beautiful.
ORION (garble).
ORION In. And locked.
ORION Okay, we got your hoses. (garble) okay,
(garble) in lock.
ORION Okay. Helmets and visors alined and locked.
ORION 0-2 connectors should be locked.
ORION 0-2 connectors have been locked. I
checked yours, Charlie.
ORION Pressure valves locked.
ORION Pressure valves locked.
ORION Boulder connectors locked.
ORION Boulder connectors locked.
ORION Boulder locked. We just checked COMM
connectors. Locked.
ORION Okay, go to vertical.
ORION Okay, vertical.
ORION We verify CG configuration.
ORION (garble) turn the page.
ORION Couple minutes away.
ORION (garble) configuration.
ORION Okay. (garble).
ORION Did you read all this, Houston?
CAPCOM We sure can, Charlie. We're following you
pretty well.
ORION And John.

END OF TAPE

ORION (garble)
ORION That John. (garble)
ORION Okay, my (garble) are on and off, Charlie.
ORION Okay, and I haven't started mine yet.
ORION You don't see one of those white gloves down
there anywhere, do you?
ORION No, I sure don't Charlie.
ORION (garble). On the floor, anywhere?
ORION No I don't see one.
ORION (garble). Ah! Here it is. I'll be as fancy
as Flash Gordon with these gloves on.
ORION Hardly get the old fingers in them.
ORION Want me to do it for you Charlie?
ORION Hey let me try this one, I need to get
one of those. Okay, now push, can you push them?
ORION Okay, I'll push the top one, you push the
bottom one.
ORION Okay, there we go. (garble)
ORION Okay.
ORION Keep going, I think I've got it Charlie.
ORION Super job, Tom. Thank you.
ORION Let's get that first connector check.
ORION Okay, wait a minute. It's a little loose,
but that's okay.
ORION Okay, (garble) okay 05 PLSS converter is
in, is yours in (garble)? Yea. Check mine. Yea. Completely in.
ORION Completely in, Charlie.
ORION Okay. (garble) the clips off.
ORION Yes, mines off. Okay.
ORION Yes, mines on 2. Okay go ahead. Hey that's good
cooling.
ORION Don't understand why I can't get cool.
ORION Circulate that (garble)
ORION Go ahead.
ORION Okay, pulse rate A and B to regress.
ORION Okay, press 02 on. Okay. (garble)
ORION Okay, fine. (garble)
ORION (garble) from 31 to 34 Charlie.
ORION Okay. How about the 02 flag, what does it
say?
ORION It doesn't say nothing. It says 02 flag
straight in (garble)
ORION Okay.
PAO This is Apollo Control. Flight Director
Pete Frank has just checked with his LM environmental systems
engineer to see if we're ready for cabin depress - cabin
depressurization and a report came back - we're GO for
depressurization.
ORION (garble) Okay, mines off the tank.
ORION Okay. There's 3.
ORION Mine is 3 by. My regulator is 32.

ORION Grabbing the wrong valve there.
ORION Who me?
ORION No, I did it.
ORION Okay, I'll start in a minute.
ORION Houston, can you give us a mark at the
end of a minute?
CAPCOM Roger. I started the clock when you said
it was off.
ORION Okay, mines off.
ORION Boy, mines tight as a drum, John.
ORION Yes, and mines leaked about, better pull
it down some.
ORION Start at 382 down to about 372 now.
ORION Mine are off to about a tenth also.
ORION Oh, that feels good. The pressure point
on the leg went away, John. There's no pressure.
ORION Hey, when's the minute up Tony?
CAPCOM Okay, there's the minute now.
ORION Took a long time.
ORION Okay, I'm down to 37. Okay, mine are
off 1-1/2, Tony.
CAPCOM Say again yours Charlie?
ORION (garble) Can't hear Charlie.
ORION .15, right Charlie?
ORION Yes.
ORION Feels like you're down to me. Back over
a little bit, Charlie. You're off.
ORION Okay, check mine off.
CAPCOM Okay, Orion, we're GO for DEPRESS.
ORION Roger, GO for DEPRESS.
ORION Your's are OFF Charlie.
ORION Okay. Okay, read them.
ORION (garble) cabin repress to OPEN
ORION Okay. Don't need to close the comm TV
breaker, I guess.
ORION No.
ORION Okay, cabin repress valve to close.
ORION Okay, go.
ORION Overhead aboard dump valve open and auto
at 3-1/2.
ORION Okay, I'll get this one.
ORION Okay. Have you got it open, Charlie.
ORION Not yet. (garble)
ORION Okay, here we go, that's 4-1/2, 4, 3-1/2
okay, Closed. Okay, gone of 3-1/2 LM suit circuit locked
up at 4.3 (garble) 4.9 slowly. Okay.
ORION Try to open for dump valve, Charlie.
ORION Okay, you ready?
ORION Yes.
ORION Okay, here we go. It's open. There.

END OF TAPE

ORION GARBLE.
ORION Yeah.
ORION That's what I've got. The pressure's (at one,
Houston.
CAPCOM Say again Charlie.
ORION Cabin pressure is down to 1.
CAPCOM Roger, we copy. Roger. we copy.
ORION A few minutes after we started that, we were
supposed to be able to open the for forward hatch.
ORION Now we're down to 5 tenths, 4 tenths.
ORION You want to put that back to R before we get out
Charlie?
ORION What does it say?
ORION No, not.
ORION Better leave it closed -- if we had a wait
we'd be in trouble.
ORION Now you don't really want to open that.
ORION You want to leave one in open then?
ORION We got it. The overhead is in open.
ORION Okay, John it's two tenths you ought to
be able to open that beading. Here she comes. She's coming open.
I've got the handle down. I know it. There it is. Hatch is
open, Houston.
ORION Wait a minute, wait a minute, okay I got it.
Look at that stuff stream out of there.
ORION Okay. Forward hatch open, PLSS is open -
partially open go ahead.
ORION Okay, forward hatch open, PLSS is open
partially open, Can you get it?
ORION Okay, it's off. Okay it's yours. I don't
think you need GARBLE, Charlie. Drink of water?
ORION You sure are great with those GARBLE, aren't
you? Turn around Charlie.
ORION Okay, wait a minute. I'll try to turn around
GARBLE.
ORION Okay, there we go. GARBLE.
PAO This is Apollo Control the crew has the
front hatch open. It sounds now as if they are maneuvering so
that Young can get in position to get out. We expect that we
will get television about an hour, to an hour and a half, after
they get on the lunar surface.
ORION If you would turn sideways, Johnny --
ORION If I could turn sideways I'd be happy GARBLE.
ORION Okay, you'll have to turn sideways to get
out. Okay, let's rest until feedwater pressure comes out.
CAPCOM Well, we don't have any telemetry here.
ORION We don't have any telemetry here. Oh, yeah.
ORION GARBLE.
ORION How long is it supposed to take to get the
feedwater to start feeding the cooling?

ORION 4 minutes.
CAPCOM About 4 minutes.
ORION Okay.
PAO This is Apollo Control when the crew gets out, steps on the lunar surface, the temperature on the surface will be about 90 degrees Fahrenheit in the sun. In the shadow of the lunar module and the shadow of craters, it will be down to about 100 to 150 degrees below zero Fahrenheit.
ORION GARBLE.
ORION Okay, fine.
ORION You can't get back in that corner. No, sideways, like I am. You can't - you ain't going to be able to get out unless you can get around.
ORION Baby, that's as far as I go.
ORION So do I, but that's what we're going to have to do. Okay, you get out and I'll put in the --
ORION I've still got a Flag A, you do too.
ORION The GARBLE is clear, very minor, isn't mine clear.
ORION You don't have any flags, Charlie.
ORION Okay, Houston, the H2O flags have just flared.
CAPCOM Okay, we copy that.
ORION Okay, to go to intermediate orbit 2 and let me see if it's working.
ORION It's working.
ORION Houston, can we go to intermediate on the cooler.
CAPCOM Rog, that's okay.
ORION I feel mine working. Okay, Houston are we ready to get out - we're ready to get out.
CAPCOM Okay, let's go.
ORION Hey, why don't you go on up, Charlie.
ORION Take care of the EPP Charlie.
ORION I'll give you that when you get out, okay.
ORION Got to get my PLSS antenna right.
ORION No, not quite not now. It comes later. Okay, get your feet out. Okay, PLSS is over on - partially over onto the porch. Come this way a little bit. Okay, you've got your PLSS hung up. Your right corner is on the door over there. Throw your rear end -- there you go, you got it.
ORION Okay, Charlie.
ORION Okay. Can you stand on the porch?
ORION Okay, wait a minute. I'll get the EPP now.
ORION Okay, that's the jet bag.
ORION Okay, GARBLE.
ORION Okay, okay are you ready to go? Okay.
Houston I'm standing out on the porch I've got the ETB in one hand and just sort of looking around here, my golly what

APOLLO 16 MISSION COMMENTARY 4/21/72 10:48CST 119:05GET 436/3

CDR a view. I can see the big boulders Charlie
was talking about.
ORION How far back is it?
LMP Hey, Houston how do you read me over.
CAPCOM Hey, you sound good there.
LMP Okay, I guess Johnnie's about out, about
out, Houston.
CAPCOM Very good.
LMP He's on the porch. Very good.
CDR Take old ETB and go down the steps here
Charlie.
LMP Okay.

END OF TAPE

1108
440/3
442/2
444/2
451/3
451/2
452/1

YOUNG Boy.
 YOUNG Isn't that nice.
 YOUNG (garble) TV is hanging right in there.
 YOUNG (garble) is on the ground.
 DUKE (garble) on the ground?
 YOUNG No, the EPB is, though.
 DUKE It's touching the ground?
 YOUNG Yeah.
 CAPCOM And John, verify your information.
 YOUNG Oh, yeah. I got the MESA, excuse me.
 DUKE There goes the MESA.
 YOUNG I'll shake the (garble). It's at the
 bottom, Charlie.
 DUKE I saw it.
 YOUNG Are you okay?
 YOUNG Oh, boy.
 DUKE Hey, hurry up.
 YOUNG (garble) I'm hurry'n.
 YOUNG Okay.
 YOUNG Hey, (garble) mysterious and unknown
 Descartes. (Garble) Apollo 16 is going to change your image.
 YOUNG I'm sure glad they got (garble). That's
 where it belongs.
 DUKE Okay, recorders off, (garble) utility
 powers are off, side panels are off. Here I come, babe.
 YOUNG Okay. Sit back and (garble) under the
 engine barrel.
 YOUNG I don't see any, oh, look at those beautiful
 rocks.
 YOUNG I don't see any particular -- we roped
 the probes off going straight down.
 YOUNG The probes standing straight up.
 YOUNG Okay, great. Oh, is this ever neat, Charlie.
 DUKE Okay, I'm out.
 YOUNG Don't come out till you see what we just
 passed over.
 DUKE That was a big rock, I tell you.
 YOUNG No, that was a big hole.
 DUKE A hole, huh?
 YOUNG You ain't going to believe this.
 DUKE Okay, close the hatch.
 YOUNG Okay. (garble).
 DUKE Okay, Tony, how far do you want me to close
 the hatch?
 CAPCOM Okay, just pull it snug, Charlie.
 YOUNG How do far do you want it closed about, Charlie?
 DUKE What'd he say?
 Just pull it snug.
 YOUNG (garble) here.
 DUKE (garble). It is.
 DUKE Hot dog, is this great.
 CAPCOM Sounds great.

DUKE You can see the -- you can the (garble).
YOUNG No kidding, Charlie.
DUKE You can see the shadows just great. Wow.
Look at that landing. You know it's got a big rock maybe about
a 50 centimeter rock with the right leg -- the left leg.
YOUNG (garble).
DUKE That was a slight miscalculation on the
ECB.
YOUNG Yeah.
DUKE Fantastic. On this first foot on the
lunar surface is super, Tony. Okay, Tony, we're making
little footprints here about half inch deep -- not kicking up
really very much. We're going to have to pull that MESA up,
John, it is too low.
YOUNG Yeah, I know it.
DUKE Let's do that (garble).
YOUNG Okay, let me get these blankets down.
DUKE Okay.
ORION Wow, is this ever superb.
YOUNG I'll pick it up.
DUKE Okay.
YOUNG Now, where do you want it?
YOUNG About right here?
YOUNG Wait a minute. You got a -- loosen this here
thing.
DUKE I know it.
PAO The crew at the present time is removing
the thermo blankets from the modular equipment storage assembly.
YOUNG Wait a minute, Charlie, let me get it.
DUKE Okay.
DUKE (garble) is superb.
DUKE Good Lord, look at that hole we almost
landed in.
CAPCOM The MESA blanket, John, that you usually
fold up and put away there, we'd like you to put it over the
TV until you use the TV.
YOUNG Roger.
DUKE Get that thing, John?
DUKE (garble) turn off, straight up?
YOUNG Wait until the (garble) comes up.
YOUNG Houston, how do you get this MESA blanket
thing up?
DUKE Tony, we need to jack the MESA up and
we can't get the lock off.
DUKE The MESA is touching the ground. Below
low case.
CAPCOM You should be able to just pull up on
it there.

YOUNG Okay.
 YOUNG That's why I thought.
 YOUNG Are you going to get in?
 DUKE (garble) the black strips, don't you?
 YOUNG Wait a minute, Charlie, get up on the
 MESA and let me pull this cord.
 DUKE I just did that, John.
 YOUNG You're not pulling back, you're pulling.
 YOUNG Charlie, pull down that way. Tighten up the
 cord. Pull down.
 DUKE Right here?
 YOUNG No, right -- just pull in a straight line.
 DUKE Okay.
 YOUNG See what I'm talking about?
 DUKE Yeah.
 YOUNG Don't fall down now.
 DUKE Looks like it's hung on the side here.
 YOUNG It's not working.
 DUKE Not yet.
 YOUNG Well, the heck with it. Let's go on.
 DUKE Wait a minute.
 DUKE No, I can't get it.
 YOUNG You want to move out of the way and
 let me see?
 DUKE Yeah.
 DUKE Tony, you just pull straight up on the
 black line.
 CAPCOM We're checking on that, Charlie.
 YOUNG Some block, you have to release, Charlie.
 DUKE I think so too.
 DUKE John, let's see if we can do it with this.
 Why don't you see if you can pick it up.
 YOUNG Look at that red line on there where it
 was suppose to be at.
 YOUNG Okay I'll pick up the MESA okay.
 DUKE Okay, let me see if I can get this thing --
 Why don't take -- okay, I got it. Why don't you -- no, I've
 got it. Why don't you see if you can pull that (garble).
 There you go. Keep going.
 PAO Charlie, there should be a green strap that
 you should be able to pull up on that'll lift it.
 YOUNG Okay, Charlie, keep lifting.
 DUKE Is that enough?
 YOUNG Keep going. That's great.
 DUKE Okay.
 DUKE Okay, we got it, Tony.
 CAPCOM Outstanding.

YOUNG (garble) MESA blanket (garble). Okay, we'll put the white blanket over there for such time when we use it.

YOUNG How far is the LRV, Charlie?

DUKE Don't know.

YOUNG We have to get our first antennas up.

DUKE Okay, here.

YOUNG We don't need that.

DUKE But I got to get it out of the way.

YOUNG Okay.

DUKE Get this other stuff. See (garble)

DUKE Yeah, I put your antenna up.

YOUNG Okay.

END OF TAPE

DUKE partially out.
 CAPCOM And we'd like the EMU check from both
 of you.
 DUKE Okay I got clear flags 94 percent and
 3.8 -- menta cooling.
 YOUNG I got clear flags (garble).
 DUKE Well Houston here we are. Sleepy
 little (garble). Boy the old Arkaty Plans are really some-
 thing. Tell you, there are rocks all over the place as we
 described.
 YOUNG at least 92 percent.
 DUKE Hey, Johnny, come on.
 YOUNG 85.
 DUKE Go get my antenna.
 YOUNG Okay.
 CAPCOM Okay you're doubling we didn't get the
 CDR's Imbrium.
 DUKE 95 per cent.
 YOUNG Do you see it Charlie?
 DUKE Yes I saw it.
 YOUNG Duck, Charlie.
 DUKE Sir.
 YOUNG Duck.
 DUKE Okay thanks.
 DUKE I'm going to get the drill out. Man I never
 saw that big hole right there.
 YOUNG Yes that's the one I was telling you about.
 DUKE Tony, right behind the LM here,
 there's a within 3 meters of a foot -- (garble) foot pad
 there's a hole, a crater, -- there's a crater that is probably
 10 meters deep -- 5 meters maybe. But 30 degrees for angles
 on the side. Okay, the drill is out, the drill is out
 and it runs.
 CAPCOM Very good.
 YOUNG Charlie, I'm off on the LRV, I guess.
 DUKE Okay, you be inspecting it.
 YOUNG The (garble) stems are out.
 CAPCOM Okay.
 YOUNG Charlie, if I get 40 feet back to the --
 from being from the SIM bay here, I'm going to fall in that
 big hole.
 DUKE Okay, you give me the table.
 DUKE Okay, antennas are all parallel. (Garble)
 not pre-released. (Garble) brake it. The (garble) are blocked
 YOUNG Yes, how about that. Being the one --
 DUKE Okay, Tony, the paint beneath the --
 on that side also below the steerable antenna is peeled off just like

DUKE on the other side. I don't see anything wrong with the steerable, I guess it's just won't work.

CAPCOM Okay.

DUKE Had to reset both sets of -- okay.

CAPCOM Charlie, we'll have some pictures for you to take in the steerable later, but we'll get that when you take your pen.

DUKE Yes, I was planning on that. Okay, John, yes, the walking just takes time.

YOUNG Yes, it takes both straps.

DUKE Here, I'll help you on this other side. Man, it worked beautiful landing. I'm glad you weren't too -- Pheh me, you were going for -- you were landing going for --

YOUNG That's what was worrying me.

DUKE Okay, here's your strap over here, John.

YOUNG Okay.

DUKE Yes, look at that big rock under there, it looks like a vesicular basalt to me. The black one.

DUKE Tony, the engine vail was about 6 inches off the ground and it's not crushed at all.

CAPCOM Okay.

YOUNG A way we go.

DUKE I'm going up towards Stoney. Get in the Rover.

PAO The crew now getting ready to deploy the lunar roving vehicle.

YOUNG I'll just run over here and grab this string, Charlie, and pull on it a little. Okay, both those (garble). On your spring up there, there's tension on it, right?

DUKE Yes.

YOUNG Okay, let's just make sure that I checked all these things.

DUKE Okay.

YOUNG Go to the left side of the front (garble) 3 or 4 (garble).

DUKE Depending which way the LM (garble) locking latch is engaged.

YOUNG Verify those one more time.

DUKE (garble) Verify your outrigger cables (garble). Both of them okay. (garble) and back away from the deploy area. Okay Charlie.

DUKE Ready.

YOUNG Yes, here we go. (Garble) loose. The bottom pins released too. (Garble)

PAO That's the back half of the Rover.

CAPCOM Very good.

YOUNG (garble).
 DUKE (garble). Man it's great. Isn't this neat?
 YOUNG (garble) it's gotta be nice.
 DUKE Good or not this is like in the training building. Only thing we don't have, Tony, is the linoleum on our floors.
 YOUNG Let's scratch the surface here Charlie.
 CAPCOM How we doing (garble) Charlie?
 DUKE (garble) wait a minute.
 DUKE (garble) pulling.
 YOUNG Okay.
 YOUNG Oh. This is much (garble)
 DUKE Than it was before.
 YOUNG Don't pull so hard I guess.
 YOUNG Can't believe that big hole back there.
 DUKE (garble) you picked up the exact bottom of this old crater.
 YOUNG There weren't any flat places around here Charlie.
 DUKE Yes but anywhere else we would have landed we would have been on a great big slope.
 DUKE Okay there goes the front wheels.
 YOUNG And the back (garble) to (garble) chassis is released too, I think. --
 CAPCOM (garble).
 YOUNG the wheels didn't lock into place Charlie. We'll have to go up there and get the (garble). Push them up.
 DUKE Okay.
 YOUNG Okay you hold that and let me run up and do this.
 DUKE Okay.
 YOUNG Now the wheels didn't lock, Houston.
 CAPCOM Okay we copy that.
 YOUNG Here goes one. Charlie got one. Is it in Charlie?
 DUKE Yes it is.
 DUKE Okay. Then the (garble) pin -- this (garble) pin isn't in either.
 YOUNG But we'll get that.
 DUKE Okay the --
 YOUNG See if the other one is in. See if you can't get it.
 DUKE Okay stop pull.

DUKE I just went down to minimum on my
cooling and it feels a lot better.
YOUNG Okay I'll try that in a second here.
DUKE Can you get it to (garble).
YOUNG No I don't think so Charlie.
DUKE Hey see what it did. It didn't
look like to me it did.
YOUNG (garble) in there?
YOUNG Yes. Yes it's sitting in something there
Charlie.
DUKE Okay there it is.
YOUNG Yes. It looks to me --
DUKE Wait a minute.
YOUNG This one is not in over here.
DUKE Are you sure?
YOUNG Yes.
DUKE (garble) you just took it out of this one
over here. --
PAO (garble) one line.
DUKE (garble)
YOUNG But just don't run off with it
Charlie.
DUKE I'm not. Okay this one's in.
YOUNG Okay this one's in.
DUKE Okay. Okay keep going.
YOUNG Don't you want to pull, Charlie.
DUKE No it says release pull (garble) will
unlock and that's what I did. (garble).

END OF TAPE

CDR Don't you want to -
LMP Release GARBLE and that's what I did.
CDR Okay, it just stepped out of GARBLE.
LMP You know it was bouncing.
CDR Stepped out at 73 degrees.
LMP Those walking engines are no longer any good
anyway not after we get down to this point.
CDR GARBLE.
LMP Watch that big rock there.
CDR Now, I see what you mean.
LMP 50 centimeters boulder right next to the
minus y footpad, angular.
YOUNG It's really long - keep pulling.
DUKE Yes, keep pulling till you hit the (garble)
till we get the weight off of these things.
YOUNG You got to pull it away, Charlie.
SPEAKER (Interference)
DUKE (garble) pick it up right off the ground
with this little cable. Can you get that - okay, that's it
John.
YOUNG Oh the cable is wrapped in.
DUKE Okay, that's great.
YOUNG Let's go get it.
DUKE Here, you'll need this.
YOUNG Wait a minute, that aerial (garble)
isn't locked.
DUKE We'll get that, okay, you lock that side.
YOUNG I'll pull these pins.
DUKE Okay, this ones not locked out here either.
Okay, now it is. (garble)
YOUNG Wooh.
DUKE Watch out. You'll turn the car over.
YOUNG I know it. Okay, Charlie, now I'll come
back up here and help you. Oh, boy, the color is so much
nicer here.
DUKE Okay, here we go.
YOUNG Wait a minute, let me get a little further
away from it (garble)
DUKE You're doing pretty well with that.
YOUNG Yes, I already picked up a rock to see
if it was possible.
DUKE Yes (garble)
YOUNG Okay.
DUKE Well, are you copying all this?
CAPCOM We sure are. We're all ears. Sure wish
we had the TV.
YOUNG Well, we'll get it for you in a minute.
Sorry about that.

YOUNG Sure is great.
DUKE Okay, Rover is within 2 feet of being on
the ground. Hi ho (garble)
YOUNG I believe we're a little up slope here. I
get the feel if I let go it'll run under the vehicle.
DUKE Yes, I do too. Okay, here we go, John.
It's on the ground, Houston.
CAPCOM Okay.
YOUNG You want to start out Charlie. (garble)
SPEAKER (Interference)
YOUNG We want to be sure we've got everything.
(garble)
DUKE Outstanding. There you go. Let's pick
this baby up and turn it around.
YOUNG Okay.
DUKE Boy look at that.
YOUNG Wait a minute, Charlie. Let me get these
cables off the front of it. I forgot about them.
DUKE You're all tangled up in that cord, John,
your right foot - your left foot. Oh, shucks.
YOUNG There it is, it's off. (garble)
DUKE Pick her up.
YOUNG Here we go.
DUKE We are up
YOUNG Mount POB.
DUKE Yes let's get around so you won't be looking
in the Sun, John.
YOUNG I'm not looking into the sun.
DUKE GARBLE.
YOUNG Mount bank is yours. There you go you're
going to have a little tricky foot with that ALSEP. Okay, what
would you GARBLE propellant for? GARBLE push these through
GARBLE.
DUKE Okay, I'll get it.
YOUNG Well, you're fine there on that traverse.
Looks good.
DUKE Makes you proud to be an American, don't it,
in times like this.
CAPCOM I agree with you Charlie.
DUKE GARBLE.
CAPCOM Charlie.
YOUNG It's right over here, sock it to me.
DUKE Don't push it in, if it's already in.
YOUNG GARBLE.
DUKE GARBLE.
DUKE I can see it from here.
YOUNG I understand all the hinge pins are in.
DUKE They're jiggled in.
YOUNG There PQ's is out. To me I think there is
one out on your side, a little one.
DUKE Both of them on my side.
YOUNG I'm pulling so hard.

DUKE Houston, I can pick up the whole vehicle with that piece of Velcro around it.

YOUNG Me and Charlie just picked the vehicle up.

CAPCOM You just don't know your own strength.

YOUNG The people who put Velcro in don't know its strength, that's the message, Tony. Get your seat belts up.

DUKE Okay, seat belt is up.

YOUNG GARBLE.

DUKE Going many miles, John.

YOUNG You bet, is your GARBLE. Seat belt is up, locked.

DUKE Hey, can you take it over there and brake it over so you won't get all tangled up with two seat belts.

YOUNG Take the other one too?

DUKE No, this is yours. Now, I don't know what to think about that.

DUKE Okay, we've got anchors to console. Okay, let's check.

YOUNG Okay, first thing, Charlie, I -

DUKE GARBLE. GARBLE valve rotating 90.

YOUNG Okay, rotate 90.

DUKE Okay, bill up.

YOUNG GARBLE.

DUKE Heaters are coming out. Okay, we're moving the GARBLE. What's that black thing over there?

YOUNG Over where, Charlie?

DUKE The back part of my seat, a couple of black things.

YOUNG What did you see? That GARBLE over there.

YOUNG No.

DUKE No, right square under your foot.

YOUNG Doesn't matter but I just wonder what it was. Move off - GARBLE. Houston we just now found a little black thing.

DUKE Little black GARBLE, it looked like GARBLE bumper guard something stowage area towing that means no consequence. GARBLE doing things the wrong way. GARBLE. That crater. GARBLE.

END OF TAPE

DUKE (Garbled)
YOUNG (Garbled) yours is down there, valve closed.
DUKE Okay. Fenders up.
YOUNG Okay. CMA configures tripod 2, rover foot
rest. There's the front hand pin. Near the front fender, Okay.
DUKE Yea, I'm going to get the camera.
YOUNG Rog.
DUKE The pan. YA-HOO, golly this is so great you
can't believe it.
CAPCOM Oh, I believe it, Charlie.
CAPCOM When you get in the middle of your pictures
there, you might give me a call and I'll instruct you on some more
we like.
DUKE Okay. Need an LMP checkout.
YOUNG Okay. Break R.
DUKE Okay, go to your right with the AGS and output
putting 39.
YOUNG Okay, Houston. I'm starting my RD checkout.
CAPCOM Okay, and Charlie 39.
YOUNG Okay, and Charlie 39.
PAO This is Apollo Control. Based on the flight
plan, the crew looks to be about 30 minutes away from getting the
lunar communications relay unit in operations with the TV going.
YOUNG My personal impression is that I am sitting
up higher in this seat right now than I did in that 116 rig that
we made.
CAPCOM I understand.
DUKE Okay, Tony. Rover will be about 60, 30, make
it 20 meters behind between the minus Y the plus Y and the minus
Z. I can't, if I get right at the SIM bay, I'm in a big hole.
CAPCOM Okay, that -
YOUNG (Garbled) Houston.
YOUNG The AMP hours on number 1 say 125 and AMP
hours on number 2 are all still low, and the VOLTS on number 1
are 85 and the VOLTS on number 2 are all still low.
DUKE You haven't lost that battery.
YOUNG No it any reading if have it, we may have lost
the - and of course the forward and rear motor temperatures are
off still low and -
DUKE Okay, bands complete.
YOUNG And the battery temperatures are all still low.
CAPCOM Okay, and we'd like you to take pictures of
the ablated paint, Charlie.
DUKE Okay, I'll do that. I'll do it SA at, at about
15 feet.
CAPCOM Okay, we'd like your update at 250, at F11 at
250 of all of the updated surfaces.
DUKE Okay. I can bend back that far, Tony.

CAPCOM Okay.
 YOUNG (Garbled)
 DUKE Tony, you can see the striations caused by
 the descent plume. It's running, John.
 YOUNG Roger. It's go would you, Charlie.
 DUKE We've got all your steering. It's great.
 YOUNG Ah, this is going to be some kind of different
 ride.
 DUKE The rover is running, Houston.
 CAPCOM Okay, and when your over the S-band, we have
 a couple of more pictures of that one.
 DUKE I just got it Tony.
 CAPCOM Okay, there's a particular surface on it that
 we're interested in.
 DUKE Stand by. Okay, just a minute.
 YOUNG Let's drive through a few of these little
 craters here, Charlie.
 DUKE You know it's hard to get to where you are
 from here.
 DUKE Okay, the braided plain surfaces, there were
 only 2, and it's the 2 above the aft-bed tank.
 DUKE John, you were coming absolutely straight down
 when you hit. Okay, Tony, go ahead with the S-band.
 CAPCOM Okay, we want you to take a picture of the
 white side of the yoke. The yoke has a black side and
 and white side. And on the white side we want at 250th. F5.6 F8
 and F11.
 DUKE Okay, I've got the F8 and F11. I'll do a 5.6.
 CAPCOM Good show.
 DUKE John you sure drive slow.
 YOUNG Yea, the wheels are skidding, Charlie.
 DUKE Okay, your rear steerings off.
 YOUNG What?
 DUKE You don't have any rear steering.
 YOUNG Is that what the problem is?
 DUKE Yea.
 YOUNG I thought you said both gears were working?
 DUKE It looked it to me, but it's not now.
 YOUNG The OR's not working?
 DUKE We don't have a battery.
 YOUNG Huh?
 DUKE Shift it to the other battery.
 YOUNG How's it doing now?
 DUKE Nope. Front's working but the rear's not.
 YOUNG (garbled) We only go to primary. Does it
 make any difference.
 DUKE Nope. The rear steerings not working

YOUNG Okay. I want to park it anyway. I won't be able to steer it now.

DUKE Say, could you - that's, that's good position.

DUKE Okay, Tony. The rear steering's not working.

CAPCOM Okay, we copy that.

DUKE Okay, Tony, the pans is complete. The struts of the LM just looks super. It's in perfect shape. No problems. The soil around here is very fine grain. Dusty, much like all the regulars that we've seen samples of from the other sites. The rocks are scattered perhaps 20 or 30 percent of the surface, and covered by boulders up to 25 centimeters. Small craters pocking up the whole place meter to 2 meter size, covering perhaps 70 percent of the surface.

YOUNG Charlie, I won't be able to get navil line from right here.

DUKE Okay, I got the LRD punch by the MESA.

DUKE And, except for the lunar steering, it works pretty good.

YOUNG I don't understand that.

YOUNG Don't ask me to check if the rear compass has been pulled. Don't ask me to do that. No. That pin is still taped down for the rear steering. Okay, how far over the (garble).

DUKE We can definitely see where we kicked up some dirt.

YOUNG Is this where all these patterns come, Charlie.

DUKE Yea. You might give a word - oh, I'm looking at a rock here that's got all kinds of dark glass in it, and beads and it's got to be a breccia. Too many different kinds. Yes.

DUKE Hey, Tony. Looking at Stone Mountain. You see some variations in it parallel to the local terrain, or to the normal surface, and they follow the contour lines and they might be, it looks to me it might be just some small ridges in it. They are scattered about. I say scattered about, that's not any good at all. They look like a couple of meters wide or so, in the same distance and separation.

DUKE What is it, John?

YOUNG Pulled the top out of the MESA blanket, it shrunk.

YOUNG Okay, Houston. I'm kneeling. The floor of the OUB, here.

DUKE Got it. When (garble) didn't know his own strength.

YOUNG Let me get -

END OF TAPE

YOUNG (garble) Velcro didn't know his own strength.
DUKE Look at this blanket bag.
YOUNG Okay, Houston, I'm going back to midway between intermediate and minimal. I was in minimal when I was driving the -- the old Rover and it seemed to be pretty good.
YOUNG Look you dirty old (garble) you - you come out of here.
DUKE (garble) struggle.
DUKE (garble) look at that bag clear away.
YOUNG Outstanding!
DUKE I thought I wouldn't be able to do that one.
YOUNG Okay, the UV camera is sitting in the Quad C pallet and it looks normal in every respect to me.
DUKE We're going to see if we can get it out of there.
YOUNG ho, ho, ho. Look at that, Charlie. Look at the giant.
DUKE We got it.
YOUNG Look at me carry it. I'm carrying it over my shoulders.
DUKE I guess we don't have to worry about dust getting on it.
YOUNG Boy, 116 is the neatest environment you can find for this kind of work.
YOUNG Okay, Charlie, I'm going to put right over here by the truck and before I could show it on my picture here and maybe you'll ride even with the bottom of the truck.
DUKE Okay, we'll just have to watch where we throw things.
DUKE Oh, oh, oh, is that nice.
YOUNG After we make connectors (garble).
PAO This is Apollo Control, the crew now getting a lunar communications relay set up. It could be about 10 or 15 minutes until we've got television.
YOUNG Okay.
YOUNG Charlie?
DUKE What?
YOUNG Do you know where we have to put this contraction?
DUKE By us right here. In front of my picture.
YOUNG Okay, now, Charlie, if I stood parallel to the shadow, is that due west?
CAPCOM That's close enough to due west. It'll be about 3 degrees off.
YOUNG Well, I can -- I just set it 3 degrees some way or another.
CAPCOM Okay, BIAS it north slightly.

DUKE Okay, a little bit more spark.
YOUNG Well, Tony, I tell you one thing, that's
the hardest job order in that crummy connector. Over.
PAO Based on the crew's description, we may
have one of two batteries aboard the lunar roving vehicle
which are not functioning but we're coming up with a test
here at the Control Center to check that out.
YOUNG Okay, Houston, the battery temperature
is reading a 100 degrees F which it was reading before -- it's
a wonder the other one always reads.
CAPCOM Okay, that sounds good.
YOUNG You got to send the battery out of here.
CAPCOM That sounds good.
YOUNG The battery is going out in the sun with
the temperature plate up.
CAPCOM Do stay on.
DUKE (garble).
YOUNG (garble).
CAPCOM And John, when you get to the first setting,
I've some new settings for you.
YOUNG I thought you might have, Tony.
DUKE (garble).
YOUNG Hey, Tony, now that we have this little
beauty pressurized, the suit just feels perfect.
CAPCOM Good show.
DUKE Shall we give credit to the tailor?
PAO That was Charlie Duke reporting that his
suit feels perfectly now that it's pressurized.
DUKE Everybody helped me get it fitted right.
(garble) the first time in the LM.
YOUNG Hey, your magnet still works, Houston.
CAPCOM Now we got a data point magnet to
work on the moon.
YOUNG Okay, where we are, the locate antenna is
coming in, on my checklist, Tony. Charlie, I forgot to pull in
all the circuit breakers over there. Push it in.
DUKE All of the circuit breakers going in.
YOUNG Okay, that'll save us some trouble.
DUKE Really can't believe you got that (garble)
up to your knees. Isn't that nice?
YOUNG You know, I was really worried about that
one day.
YOUNG (garble) some. (garble).
DUKE Ah. Here's like in the training building.
DUKE Well, I mean the gear is working exactly
like we -- and I'll tell you those guys is going to be doing all
of them and Jerry Thorn and Bob (garble) and Cooper (barble)

DUKE they were all (garble) but it's really
paying off, I'll tell you.

DUKE He's locating the connectors.

DUKE (garble).

DUKE Okay, (garble) or high gain.

YOUNG That's what I thought.

END OF TAPE

DUKE This is so easy.
YOUNG GARBLE.
PAO John Young at this point is apparently setting up the ultraviolet camera while Charlie Duke is working on the lunar communications relay unit and more specifically the high gain antenna.
DUKE Okay, low gain antenna, high gain antenna installed.
DUKE Okay, John here comes a big man, Tony, I roched the first time.
YOUNG Outstanding, that's got to be a first.
DUKE It is for me.
YOUNG Okay the old bubble burst so it's got the bubble right in the middle.
CAPCOM Okay.
YOUNG Okay, GARBLE azimuth 14 and elevation 48 and say again what you want me to make it.
CAPCOM Okay, we'd like to make the azimuth 98.
DUKE 98?
CAPCOM Right, we're changing targets.
DUKE That ain't even close.
DUKE Yeah, okay.
CAPCOM And the elevation is 28. And watch the film advance as you turn the power on.
YOUNG And turning it to azimuth just completely destroyed whatever level it had. 98 what now?
CAPCOM 98 and 28.
YOUNG 98 and 28. Okay.
DUKE Well, Tony, you the old earth is boresighting into site.
CAPCOM Outstanding.
DUKE Roger, right on babe. I think. Hey, you've really got to bend back to see that beauty coming right over head. Okay. PD.
PAO That was Charlie Duke describing the view of earth which is virtually overhead.
DUKE Okay Tony, I turned the power switch off when I started the power switch was on - I turned the power switch off on the TV.
CAPCOM Okay.
YOUNG Okay, Houston will you go where this bubble just broke off on one side or do you want to level it everytime.
CAPCOM Is it off the case?
YOUNG Yeah, it's off the case.
CAPCOM Okay, That's just fine - as long as it's off the case.
YOUNG Okay.

YOUNG Okay now, all you want me to do on this first one is turn the power switch on, right?

CAPCOM Right, power switch on and watch the film advance as you come back - so you can tell us how many degrees.

YOUNG Okay, it looked like it was better than 90, that's about all I can say about it - maybe 100 or 110.

CAPCOM Okay. Okay. Let's just leave it there.

YOUNG Okay, you're at VHF.

DUKE Is that what that is, ah so. I can hear you, John.

YOUNG Okay, I guess that tells us something about the camera operation.

CAPCOM Right, but no change -

YOUNG GARBLE I'm sure Houston, I think the mode changed. Well, I don't know that'll probably be in a minute or two - two and a quarter minute. Okay, I want to -

DUKE Is this ever a neat operating environment.

YOUNG Okay, Tony, I'm reading - my internal with S-band is 26, temp is 14 GARBLE is 22 over.

YOUNG Oh, oh, oh, GARBLE Charlie.

DUKE Yeah. Okay, over my head. Man that guy that put on the velcro, really.

YOUNG He gets paid double time, Charlie.

DUKE I'll tell you -

YOUNG For every strid.

DUKE It's amazing. Hey Elsie all your blankets are 100 percent open.

CAPCOM Okay.

DUKE GARBLE.

YOUNG Going to switch to two.

DUKE I'll be darn if the old GARBLE didn't go on like it was supposed to. Hey Tony you're out ahead if you got 40 on the single string, look at that.

DUKE Getting a single, Tony?

CAPCOM Ah, we're working it.

DUKE Okay, you got 40 you got external in your mode switch 2 and the power is 2, correction, I didn't check the power of the A to S-band. The power is 12, 14. Over. Correction make that 18.

YOUNG GARBLE.

DUKE GARBLE.

PAO Charlie Duke is getting ready to begin feeding us a television picture. We should have that shortly. They have now been on the lunar surface for about 1 hour 8 minutes.

YOUNG Okay, it's going.

END OF TAPE

DUKE (garble)
CAPCOM Stand by a second, Charlie.
Okay, it's looking pretty good. Don't have a picture here in the room yet, but we're getting data.
DUKE Okay, the dap is coming out.
YOUNG Houston, as far as peeping around you guys would rather we'd be outside than inside wouldn't you?
DUKE Okay, Tony, the camera - the TV camera is pointed right down at the ground, fore to the Rover.
CAPCOM Hey, our comm just improved 900 per cent. That's beautiful.
PAO We're getting our communications now through the Lunar Communications relay unit, the suitcase size communications package that will be carried on the Rover, and we should be getting television shortly.
DUKE Golly, look at that. Did you get the pan out, John?
YOUNG Which one, Charlie?
DUKE The one that you broke the wire on.
YOUNG No, I haven't but I'll work it later.
DUKE What is it to?
YOUNG I don't know. (garble) I think it's to the (garble)
YOUNG Man, I tell you, if my - if this - my Christmas stocking looked like this ETB, I'd be saved.
DUKE Okay, magazine P, the X is in the middle, and the frame is lined up.
CAPCOM Okay, magazine pop up.
CAPCOM Hey, Charlie. Verify the TV power switch is on.
DUKE Stand by.
YOUNG Got it Charlie.
DUKE You mean the LM power switch or the one on the TCU?
CAPCOM On the TCU.
DUKE Okay, I'll shoot it to on, okay momentary on back to center.
CAPCOM Okay. Hey, we got a picture.
DUKE Yeh!
YOUNG Of the ground no doubt.
CAPCOM Of the ground.
DUKE That's right.
YOUNG That's nice clean ground.
DUKE Okay, the camera is running, the 16 mm is running.
CAPCOM Outstanding.
DUKE (garble)

CAPCOM (garble)
DUKE This Mission is full of firsts, (Garble)
but they mean something.
YOUNG Oh, is this easy to do. There's no gravity.
I really like it. This is about the neatest thing I ever saw.
Okay.
DUKE Hey, you're looking at me with the big
eye.
CAPCOM Right, the big eye's on you, Charlie.
YOUNG Trying to see if you're nervous Charlie.
DUKE Hey, can't just throw those bags over there
like I used to, they bounce into the dirt.
YOUNG Yes.
DUKE How's the picture, Tony?
CAPCOM A good picture. Beautiful, outstanding
color.
DUKE Super.
CAPCOM You're in living color.
DUKE Okay, I'm putting magazine bravo. Okay,
magazine bravo is going on the Commander's camera, I just
tried to blow off the dust, Tony, and it's starting in frame
count number 4.
CAPCOM Okay, bravo 4 and keep count of how many
times you blow off the dust.
DUKE Oh, it didn't work so -
YOUNG Well look, this thing says lock on it
Charlie.
DUKE Okay, this goes to the other SEK.
YOUNG Charlie, this tells you what to do.
DUKE How about that? A new first. This is
so super. Okay, 38 TDC 2 B6 and 500 under the seat. Look
at all the little goodies, oh, oh. No vercro, man did it
again.
YOUNG Got you huh?
DUKE Look.
YOUNG Ah, come on (garble) loose.
YOUNG I tell you Houston, I'm just as cool as
a cucumber, and this sun is so bright you can't believe it.
CAPCOM Outstanding.
PAO They've been on the lunar surface now
for about 1 hour 16 minutes and both back pack portable life
support systems look good at this time.
DUKE - The ETB into the Commanders seat.
YOUNG Hey, your vice is in Charlie.
DUKE Super. John, I don't know if this film
is really going to open here, I can't get it wedged in like
I did.
YOUNG No, I don't think -
DUKE How you read, John, you're cutting out.

YOUNG Loud and clear Charlie, I'm talking to myself.

DUKE Oh, okay.

YOUNG By golly, we did it again.

DUKE What?

YOUNG I would never have thought that on the Moon, we'd run into each other right here at the seat, but we did at practice every time.

DUKE Every time.

CAPCOM Now you're consistent.

YOUNG I have some timeline guide for you, do this EVA 2 or 3 more times and I may get it down. The sun compass goes under your seat, maps going over in mine.

DUKE Here comes the big eye, the 500.

YOUNG Oh, that's a clean dust patch, Houston, but I don't think it's going to last.

PAO That's the 4UV camera in the middle of the frame right now. You can tell that the dust brush.

YOUNG hangs in there pretty good, picked up the front of the Rover to see the dust brush is latched.

YOUNG Okay. Okay Charlie, where's the rake? There it is.

DUKE Look up there under the duma flicky. Oh yes, the old duma flicky's got it.

END OF TAPE

YOUNG Okay, Charlie. Where is the rake. There
it is.
DUKE It's up under the gimbal (garbled).
DUKE back to the MESA.
DUKE Okay.
DUKE Sorry I blocked your picture there, Tony.
YOUNG Oh, Fred-0 is to be congratulated for think-
ing how to put this rake in.
DUKE Yea, that's a new first.
YOUNG Darn right. That's good stuff. Save us a lot
of work later on.
PAO That picture of John Young working at the
lunar roving vehicle.
YOUNG Okay, that's about the size of it.
DUKE Audio maps. Which audio map do you want to
look at, John. Just like training. The picture of Hadley Rile.
I'm just teasing, Houston.
YOUNG Looks like we're down some, I guess on the
time line already.
DUKE Are we.
CAPCOM No, your right on the time line.
YOUNG Well, we're pretty even.
DUKE Okay. I thought we were moving along pretty
good.
YOUNG So did I.
CAPCOM Your doing just fine.
YOUNG You got the EPD up stowed?
DUKE Yea, It's all done, John. Cameras are up.
YOUNG Discard the crew pallet. Okay, your going
to back, go inside.
DUKE I've got to get the pallet out.
CAPCOM Hey, Charlie, don't throw that pallet out,
we'll hold it that for later.
DUKE Okay.
CAPCOM We'll get that at the end of the EVA.
DUKE Super.
CAPCOM And you can skip all the (garble) parts,
go on after that.
DUKE (garbled) Okay, the SRC's next. John, why
don't you unpack the SRC. It's on the right side.
YOUNG Okay, I'll get it.
DUKE And I'll get the cords down and hooked up to
my seat.
PAO The SRC is one of two sample return containers,
or rock boxes.
YOUNG Yea, I just remembered.
DUKE It's nothing.

YOUNG Nothing up there?
DUKE Well the only reason we had to go in there,
was stack tie her down.
YOUNG Okay.
DUKE Right, and we can get the other, the other
stuff is just food and -
YOUNG Yea, I'm fine.
DUKE stuff like that.
YOUNG I got that. I thought it was something on
that order. One small step for Charlie is one giant leap for me.
I'm looking dead level with him, with the table on the ---
DUKE Maybe I did get it a little high.
YOUNG Yea, I think.
DUKE Okay, Tony. That pressy precision Young,
was coming right straight down when he hit. We didn't move an
inch on those foot pads.
CAPCOM Very good, then would you verify that you
got the sun shield on the TV camera.
DUKE Not yet, we'll get it.
CAPCOM Okay.
DUKE That was going to be part of the pallet's
stuff, I'll get it. I don't know whether John can reach it or
not.
YOUNG That was going to be part of taking it out
to the table but we did skip that part.
DUKE Oh, that's right, you know we did. Gimbal
closed.
YOUNG There goes that shield thing that came off.
DUKE What shield thing?
YOUNG That thing down there.
DUKE That's okay.
YOUNG Make it hard to close the box later on.
DUKE Guess what?
YOUNG What Charlie.
DUKE I can't reach the stuff. Look at me John.
YOUNG Yea.
DUKE Look at that. I just polevaulted off into
the MESA to get that beauty.
YOUNG Charlie, what did I do to the SRC. You've
got that piece of paper on you.
DUKE Okay, the SRC, it just says seal control cycle
SCB to left hand tool carry.
S YOUNG Okay.
DUKE I droped the sun shield, john. I've got it.
YOUNG filled with dirt?
DUKE I can blow a little dust off, Tony. It didn't work.
CAPCOM Okay, that's 2.

DUKE Okay, hold the camera there, Tony, and I'll
put the sun shield on.
CAPCOM Okay.
DUKE Yea, it looks pretty good to me.
CAPCOM Outstanding here.
DUKE It's on straight. How about you. Okay.
YOUNG Okay.
DUKE Hey, John.
YOUNG Cable.
DUKE Box.
YOUNG On there.
DUKE Better keep those MESA blankets on this one.
Best side closed. I, the sun's on this side of the MESA.
YOUNG Hey, do you know how to deploy that thing.
DUKE What thing.
YOUNG That critter.
DUKE I'm going to get the control sample here.
YOUNG Okay, I'll get the flag.
DUKE Okay. And it works. You can spin it right
up, John. Just like we started doing in training. Okay, while
you're getting the flag, I'll go open the ALSEP door.
YOUNG Okay.
DUKE You know another 10 feet back, and we'd had
a terrible time with that ALSEP.
YOUNG That's why I was glad I could see the ground.
DUKE Yea. Did you see that big thing coming down?
YOUNG You bet ya.
DUKE Man, I tell ya -
YOUNG While we were moving forward there toward there
a little -- trying to.
PAO That's commander John Young in the picture
now.
DUKE Here we go. Yea, it came open. Ha Ha.
YOUNG What came open, Charlie?
DUKE The ALSEP's doors. Okay, your descent switch
is on, Houston. Descent ECA TEMP monitor. And we will remove
the experiments package. This ALSEP is right at eye level, Tony.
CAPCOM Very good.
DUKE Exactly eye level.
CAPCOM And John, we'd like the LIO can in the sun.
DUKE Okay.
CAPCOM All correct - (garbled)
DUKE (garbled)
CAPCOM In the center of the MESA cavity, sorry.
YOUNG Yea, I know that. Okay, tell him to forget
it.
PAO That's the flag that Young is getting out now.

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YOUNG according to this. Huh (garble)

DUKE Doing your thunder back here, John. I'm taking all the ALSEP stuff out.

YOUNG Never seen it fail.

DUKE Tony, I'm going out for the olympics. I just swung that little, that little gary bar on the ALSEP package, the crooked one about 200 meters, it looked like. There goes the other one. It would be real wild on the hammer throw. Look at that beauty go. Just created my own secondary. How are you doing with the flag, John?

CAPCOM Outstanding, Charlie. I'm sure he'll hold the record now.

END OF TAPE

YOUNG I doubt that maybe for the Cayley Plains Saturday afternoon. Shindig. You really should sit the flag up on a hill, Charlie but there just ain't one.

DUKE I know John.

YOUNG I'll put it right here -- big rock.

DUKE Are you setting it up now?

YOUNG Yeah.

DUKE Okay, wait a minute, I'll run and get the camera. Can't pass that up.

YOUNG That's all right. That's got it.

DUKE Wait a minute. You're not getting away from there without me getting your picture.

YOUNG Okay, Charlie. We can get that in a minute, okay?

DUKE I got it. Here we go. Come on. You get that plow canaster and I'll get the camera.

YOUNG Okay. That's fair enough.

DUKE You are black from the knees down already.

YOUNG You know, I had to go -- I've been on my knees twice to get that. There's no way to avoid it. That's why I'm glad the pressure suit bends.

DUKE Okay, Tony. We start the LMP camera for the flag.

YOUNG Houston, I'll admit I forgot that the loud caster was suppose to be mountaneous and I missed that step but I'm sure glad you're first attempt to tell me to put in the (garble).

CAPCOM Yeah, that was my error, John.

YOUNG A bady.

DUKE And Tony, the Rover tracks are just -- we're barely -- it's barely sinking in.

CAPCOM We can see that.

DUKE You can't put it too far down in the middle of the --

CAPCOM Say that again, John?

YOUNG Okay, I got in there now.

DUKE Hey, John, this is perfect, with the LM and the Rover and you and Snow Mountain and the old flag. Come on out here and give me a salute. A big Navy salute.

YOUNG Look at this.

CAPCOM That's a pretty outstanding picture here, I tell you.

DUKE Come in a little bit closer. Okay, here we go. A big one. Off the ground a little bit more. There we go.

YOUNG Good.
YOUNG I'd like to see an Air Force salute, Charlie,
but I don't think they salute in the Air Force.
DUKE Sure we do. They fly high and straight
and lands soft.
YOUNG Okay, Charlie, say when.
DUKE Here we go.
YOUNG Do that again.
DUKE One for you. I'm sure glad I had one more.
CAPCOM This looks like a good time for some good
news here the house passed, space budget gets the 277 to 60 which
includes the votes for the Shuttle.
YOUNG Beautiful, beautiful.
DUKE Now. Wonderful, wonderful. Tony, again,
I'll say it, with that salute, I'm proud to be an American.
I'll tell you what a program and what a place and what an
experience.
CAPCOM So am I.
YOUNG Man, I'll say it too. The country needs
that Shuttle mighty bad. You'll see.
DUKE I just want to say thank you.
YOUNG What do you want me to do with this camera,
Charlie?
DUKE Put it on the left-front -- right seat in
back of the -- no, it's got to go under your seat. I'm sorry.
YOUNG That's okay.
YOUNG Okay both cameras are going under my seat,
Charlie, in case you look for them.
DUKE Okay, I don't need one.
YOUNG Okay, the MESA blankets are all closed,
Houston.
CAPCOM Okay.
YOUNG (garble) canister is in the, the black box
is sitting on the table. I'm sure that's okay.
YOUNG You know, we hardly kick up any dirt at
all, Charlie, just hardly any.
DUKE I know. Hey, John, I'll let you put this
together. I'm really -- think I know how to do it but I don't
want to foul it up.
YOUNG Here you go.
DUKE Everything else is ready.
YOUNG Okay, Houston, we over by the MESA. You
can't see. I'm putting the UHV together and Charlie's got
most packages down and now Charlie's going for his hot stuff.
PAO Duke and Young have now been on the lunar
surface for a little more than one and a half hours.
YOUNG Look at that, Charlie.
DUKE I think that's good, John. Okay, I need
this one right here.
YOUNG Okay, I'll leave the other one up here.

DUKE Okay. Okay, I got the don removal too,
Tony. And it's on.

PAO The next step here will be for the crew
to get the package of lunar science experiments out and ready
to deploy.

CAPCOM Okay, while you're standing still, how
about AMU check.

DUKE Okay, I got a --

YOUNG What makes you think we're standing still?

DUKE I'm clear flag 75 percent, just about
man cooling and 38.

CAPCOM Okay, we copy.

YOUNG I through that?

DUKE John, I threw a thing all the way to
those double craters over there.

YOUNG Okay, I'm going to reset (GARBLE) UV. I
got the top off the hot package. Let me move this around so
you don't run into it.

PAO That view on the TV is of the lunar module
with the LM's steerable antenna which has not been working
showing at the top of the LM.

DUKE Okay. Look out. Here it comes. Hot stuff.

YOUNG Charlie's got it.

DUKE Okay, what's your new settings now?

CAPCOM Okay, they're 56 and 76.

DUKE Okay. Going into reset. Mark.

YOUNG It's moving it, take an imagery now.

CAPCOM Okay.

XAPCOM I'll warn you when we get to two and quarter
minutes.

DUKE Okay, 56 and 76.

CAPCOM That's affirmative.

YOUNG Okay, Tony, the RTG is fueled.

CAPCOM Very good.

DUKE Okay.

PAO John Young now pointing the far UV camera
to another target. This camera takes a sequence of pictures,
takes two pictures in that sequence, one on photographic film
and other of the spectrum which would provide scientist back
on earth with an analysis of the content of what the camera
is looking at.

DUKE Great looking.

YOUNG 76 --

END OF TAPE

YOUNG (GARBLE) 6.
YOUNG Okay. Houston the earth is maybe - the earth is maybe a quarter - it's right in the middle.
CAPCOM Outstanding. You did a good down center alignment.
YOUNG I can't believe it. I mean the crescent is right in the middle of that scope. I might move it a half of a degree but I wouldn't move it any more.
DUKE MAN I'll tell you.
CAPCOM Okay, Charlie, go, okay.
YOUNG Let's go for it.
DUKE I just wanted to rest I'm starting cold.
CAPCOM Right, just take it easy there is no hurry.
DUKE I'm going out where this - man look at that breccia, John. Right there - this big, subrounded -
YOUNG It keeps reloading Houston.
CAPCOM Okay, so you should have your two and a quarter minute so anytime you want to go on.
YOUNG Okay, reset, film advance 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 reset. Okay Houston it did something besides - moved before I reset it that time.
CAPCOM That's okay, John, just press on.
YOUNG It was -
CAPCOM Do you mean the camera moved?
YOUNG Reset. Yeah. When I did the 15 seconds and then the reset, it reset again, it was moving, like it wanted to go back to imagery. Now it's going back to - okay, now it's going back to the earth - it's going back to spectroscopy. Does that sound all right to you guys?
CAPCOM Okay, it should only have done that - did you reset at the beginning of the 15 seconds?
YOUNG That's affirmative.
CAPCOM Okay, that started a problem there - that thing should have been clocked out on your checklist to do that refit.
YOUNG Okay, hold on a second, we'll regroup here.
DUKE You want us to do it again?
CAPCOM Okay, John, when it comes back to direct
YOUNG How you coming GARBLE.
CAPCOM Go ahead and watch for that thermovent and then time 15 seconds from the thermovent. Don't do a reset when it comes back to do it.
YOUNG Okay.
DUKE Houston, I've got about 20 meters away and the RTG package fell off. It hit the dirt with a current like a bomb. It got a little dusty but the fens are okay and all the experiments seem to be intact.
CAPCOM Good show, John.

YOUNG will not be - we want to make sure we knock the dust off those connectors before we take the caps off of them.

DUKE I agree.

YOUNG How did this come off that thing?

DUKE Okay, it seems --

YOUNG Okay.

DUKE Okay, it seems to be locked now, Tony, I don't know what happened - it just - I'm pushing on it back at the LM but it just popped off.

YOUNG 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, reset, okay, reset again, 3, 4, 5, reset, reset.

CAPCOM Outstanding John.

YOUNG It's not GARBLE.

DUKE I think we got it that time.

DUKE Good show.

CAPCOM John Young is pointing the UV camera at earth.

YOUNG Okay.

CAPCOM Hopefully we'll get from these pictures the first view of the hydrogen clouds surrounding earth.

DUKE We'll be able to hear that little rascal working all over the moon. Okay, I'm going to shift the cosmic rate now, and close the sequence spade, over.

YOUNG It's red range.

DUKE Taking a break.

CAPCOM Good show Charlie, don't - don't strain yourself. Take it easy.

DUKE Hey, Tony I'm -

CAPCOM Just stand there for a while.

DUKE I just climbed a little ridge.

YOUNG Okay, Houston you won't believe this the red ring pulled off the cosmic ray panel.

CAPCOM Did the top slide downhill?

YOUNG Very exposed.

YOUNG There's the top exposed with a bunch of slides in there and glasses and a black thing and you know, I think that's what you mean, isn't it.

CAPCOM Right, that's right so it worked out okay.

YOUNG All right. GARBLE. Say Tony, this is just a real, this ray pattern extends back about 200 meters or maybe more to the east and goes as far as we can see off to the west which is maybe another 200 meters. I can see Smoky Mountain now and I can see Dome. GARBLE is plainly visible with two big craters on it's flank and if you look toward Smoky I see some big craters up on the top but I can't see

Ravine or any - or North Ray yet. Okay, Houston, you want to do the LTA GARBLE to mode 1 and 2.

CAPCOM That's affirm, we want to go to mode 1.

YOUNG Okay, going to MWWB and produce this

EBW.

CAPCOM John, we'd like Mat 2 check on the way out to the ALSEP site and you do that by turning to your left front and right front drive powers to buss B.

YOUNG Okay.

DUKE The size of that rock. Tony, it's about a 2 meter boulder, I just passed. Say John.

DUKE Okay, the land breaker is going in and we are reading in the front panel - we are reading 1 degree south, pitch is zero. And roll is half a degree right.

CAPCOM Okay, we copy that. We'll give you a torquing angle in a minute and would you confirm that the two bay doors are shut?

DUKE Sequence bay doors are shut and we're pointed up about 2 degrees.

CAPCOM Okay, pitch up 2.

YOUNG Start over. Charlie's down there to the southwest. Can I go reset on this thing to clear these numbers off before 2 minutes.

DUKE Yeah, we can go reset.

DUKE Say that again.

YOUNG Yes, go to reset.

DUKE Tony, I think that the best place here for the ALSEP is to the LM 11 o'clock position and I'll let John give you the range, but it's up on the top of a dome and it's fairly flat and I think John can drive about 290 maybe 28 down over a ridge for the thumper. There's just not any flat places here, Tony, I uh, I can't this is the flattest I can find.

CAPCOM That sounds good Charlie, and John is 266.

YOUNG Understand, 266.

DUKE Okay, Tony the regolith hasn't changed any - out this far. We still have numerous subrounded to angular blocks in the partially buried is a secondary - here's a big boulder - the one I described - it's 2 meters across with about a 50 centimeter fillet above the range.

YOUNG Houston, say again what you want me to do this thing check out the rear steering, check out the battery.

CAPCOM Okay -

END OF TAPE

DUKE (garble) hasn't changed any out this far. We still have numerous subrounded to angular blocks in the - partially buried. Here's a secondary - here's a big boulder - the one I described it's 2 - 2 meters across with about a 50 centimeter fillet -

YOUNG Hey, Houston. Say what you want me to do with this thing to check out the rear steering or check out the battery?

CAPCOM Okay, we'd like you to just start out with the left front and the right front drive power on bus C. If the battery 2 isn't working, you shouldn't go anywhere.

YOUNG Okay, left front, right front. Power on battery C, and 266 on the gyro torque.

DUKE Tony, I'm looking at this big rock, and it's a 2 rock breccia, the matrix is a black rock - blackish to bluish with some very fine submillimeter size crystals.

YOUNG Hey Houston. You wouldn't believe this. Now our amp powers on battery 2 are up and they're reading 118 and the battery volts are reading 62. You want the whole business before we start out? The amps on 1 are 118 on 218 68 volts 68 volts no amps of course and 82 degrees on the motor temps and offscale, 82 degrees on the batteries and offscale low on both motor temps.

CAPCOM Okay, we copy. Roger.

YOUNG I don't understand that.

YOUNG I just did something. Oh, that's alright.

DUKE Darn, it sure looks like we're on more than a 2 degree landing slope, but it's not.

YOUNG Let's don't read that battery check now. We got all those good readings, Houston.

DUKE Turn on your rear steering, John.

YOUNG I had that on Charlie.

DUKE Okay, it's working, it's working.

CAPCOM Okay, if everything's working.

YOUNG Maybe it just needs to sit around and heat up.

DUKE Okay, back to this rock, the small frags are whitish in color with a small submillimeter crystal - millimeter size crystals of - it looks like brass olivine in the white matrix, in the white class let's say, and it's a biggy, it's right near the ALSEP, we'll get a picture for that - it'll show up in the pan.

CAPCOM Okay, John, we'd like you go ahead and drive out on battery -

YOUNG Okay, you want me to pull bat A and B circuit breakers?

CAPCOM No, negative. Just put the left front and right front to bus C.

YOUNG Okay, left front and right front are on
bus C. It's moving. Yes, it's going like a champ.
CAPCOM Good show, everything looks good.
DUKE Can you -
DUKE You got a small rooster tail, John, but
not very much of one.
CAPCOM Could you give us an amp reading while
you're driving?
YOUNG Man, I tell you - yes, amp is 18 amp.
Okay, I'm not doing very many clicks, about 22 on the front
and exactly nothing on 2 and nothing on the other one.
CAPCOM Okay, we copy.
YOUNG There's just hardly any places that doesn't
have craters around here. Is that where you want to put the ALSEP
DUKE This is the levellest spot I could find.
YOUNG I tell you Houston, there's just no place
that doesn't have craters and things around it.
YOUNG Ya think 290 from here, huh?
DUKE Yes, I'm about done here.
YOUNG Okay, we're 1/10 on the range in distance.
CAPCOM Okay, we copy that (garble) we can go back
to normal.
YOUNG Maybe right over here, Charlie, right
here, huh, is that too close to the -
DUKE Is that 290.
YOUNG No, let me show you 290, like this.
DUKE Okay, that's okay.
YOUNG It's right down in this hole is what it
is.
DUKE I can move it over here another 30 feet
or so - you'll be alright.
YOUNG Okay, do that. Oh boy, I tell you, this
place is full of holes, Houston, and rocks.
CAPCOM John, when you were back at the cosmic
ray, did you happen to notice what the temp label read?
YOUNG No, I forgot. Want to go back and get
it? Be just a second in the Rover here?
CAPCOM No, negative.
YOUNG Okay.
CAPCOM And John, when you get a chance you can
go back to normal configuration on the Rover.
YOUNG Okay.
DUKE How does that look out there John?
YOUNG It looks like everything else around here,
full of holes.
DUKE I know, and lots of craters.
YOUNG Lots of craters.

YOUNG We're not lacking for them, Houston.
DUKE Tony, this is just an indiscribable ex-
perience. I'll tell you.
CAPCOM I bet it is Charlie.
DUKE Hey, what's the difference between a hole
and a crater?
YOUNG It beats me.
YOUNGS This has just got to be - if the number
of craters are any indication, this has got to be old material.
DUKE Even the craters have craters.
DUKE Man, I am black already, from the knees
down. Okay, do you have the (garble) lined up?
DUKE East west
YOUNG Yes, you going to deploy your drill down
there, huh? To the south. I'll park over by that rock,
Charlie. Heading 180?
DUKE Yes, that would be good. Yeah that'll be
good. Great.
YOUNG I'll tell you why I'll park over by that
rock because it drops off like a (laughter)
PAO This is Apollo Control. We appear to
have 2 good batteries in the lunar roving vehicle, and we
should be getting a television picture again, shortly. The
TV is taken down and turned off when the Rover is moved.
Young has driven it out to 300 -
YOUNG Dusty here and man we're -
DUKE Tony, I'm tapping the RTG pins to get
the dust off of them and it's coming off real good.
CAPCOM Okay, very good.
DUKE I'm sorry about dropping that thing,
Tony, but golly, (garble) to me, but it just came sailing
off of there.
CAPCOM It's going outstanding, Charlie.
YOUNG Okay, Houston. And the seat belt worked,
I'm pleased to report. Oh boy.
DUKE As near as I can make it it's 60 foot,
Charlie.
DUKE Hey, that looks great, John. That's
perfect. Well -

END OF TAPE

DUKE Well, my moment of truth is about to arrive.
YOUNG It sure looks easy to me, Charlie.
PAO The moment of truth that Charlie Duke was
talking about is the beginning of drilling the holes for the
heat flow experiment.
YOUNG Charlie, does that thing look like it's
Pointing at the earth? I don't --
DUKE Can you see the earth?
YOUNG No.
DUKE It looks pretty close. To me, it's almost
vertical.
YOUNG There we go.
DUKE There it is.
PAO Duke and Young are now trying to get the high
gain antenna pointed toward earth so we get the TV back and we've
got black and white picture now.
DUKE It's beautiful. Houston you ought to -- Houston,
you ought to have it now. It's beautiful.
DUKE Is Houston reading you, John?
YOUNG Houston, do you read, over?
CAPCOM Now we're copying you 5 by. And we got
a picture.
YOUNG Okay, fine.
DUKE Tony, I'm stopping a little short on the
heat flow electronics because I -- as I go on out I'd be in
a little crater and I couldn't get it level, over.
YOUNG That thing. That little crater might be --
that little crater just might be what you call it, do you
know?
DUKE We may have come a little further
then we thought we were going to, Houston. Now, I see double
spots back there and -- or what looks like double spots and
we're a good ways past that.
CAPCOM Okay, we copy that.
DUKE Let's see, there's the crater.
DUKE Okay.
DUKE John, we're not much off, I tell you.
YOUNG Yea, I hope not Charlie.
CAPCOM John, did you happen to notice what heading
you were driving on the way up to the ALSEP site?
YOUNG No, I wasn't watching it. To be honest
with you, I'm trying to keep beside old Charlie. You can
get lost down here.
DUKE Damn it.
DUKE Again a dim label from our RTG package
(garble).
YOUNG There's an (garble).

YOUNG There we go. Here comes that baby.
 DUKE Boy, I'll tell you, John, getting your
 alinements up here is going to be something.
 YOUNG Okay, we'll work that problem Charlie,
 when the time comes.
 DUKE Okay, Tony, the old idiot proof decal has made
 it the probe is in the left-hand and the wires are not crossed.
 CAPCOM Very good.
 DUKE Okay the temperature -- the short plug
 is pulled and the temperature reading is reading about like
 golly, I can't believe it. It reads -- it's reading about
 like 3 quarters scale. Tony, let me give you a question here.
 The down sun 8 probe is going to be within 2 meters of
 a -- of about a 5 meter crater, over. It's a meter D, is
 that okay or do you want me to move it?
 CAPCOM Can you move it to crater free area?
 DUKE Yes, I can but it will be more towards
 the portable -- I mean LSM.
 CAPCOM Okay, we'd like to do that.
 DUKE Okay. Now the one -- the one upsun is
 perfect, straight upsun.
 CAPCOM Very good.
 DUKE Yeah, this is a super place right here
 but it's upsun one -- okay here we go and a big drill coming
 up. Down into the crater he goes. There's a secondary.
 a little one. It's like big eyes looking at something else.
 YOUNG Yeah.
 DUKE Boy, John, I'm going to need about 23 gallons
 of water. This stuff sure tastes good.
 YOUNG Okay, that connector is made somehow. Okay,
 drill back over here and straighten out the line.
 CAPCOM Now while your standing ...
 YOUNG Back over here and straighten up the line.
 CAPCOM Now while your standing over the roller,
 there could you read off the heading.
 DUKE Well, I almost tried.
 DUKE Oh, yes we're heading is 1 bearing to the
 LM is 033 the heading is 195.
 CAPCOM Okay, 195.
 DUKE Rog.
 YOUNG It's hard to believe.
 DUKE What's that John?
 YOUNG That line between the central
 station and ALSEP is gonna float in the air.
 DUKE Yes, things are really stiff aren't they?
 YOUNG Yes.
 DUKE Okay, the collar is locked on

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DUKE a central station. Let me get the sub
palet here.

DUKE Oh, I did it again. Wrong end. Get in there.
Okay, the handle is in. No.

END OF TAPE

YOUNG Okay, the handle is in. No. Here comes the old, lookie here. Houston, do you want us to tilt that package, that RTG package is okay, with dirt on it's floor isn't it. Doesn't need to be all white.

CAPCOM Okay, we'll work that. No, it doesn't have to be all white.

YOUNG Okay. That's my first question of the day. Okay.

CAPCOM Our first answer.

YOUNG I didn't think you'd had several problems.

DUKE Tony, the drill tripod deployed just as advertised.

CAPCOM Very good.

PAO Charlie Duke now getting the drill stems out. He'll drill two holes. Hopefully about 10 feet deep and about 30 feet apart.

DUKE I knew it.

CAPCOM Gee, it doesn't stand up any better there than it does here, does it.

DUKE No, and I dropped the core tap. But I recovered those smartly. I'm getting where I can bend down in that suit, Tony. When I first started off, I was going head over heels, but now.

YOUNG Look at that stupid thing.

YOUNG There.

DUKE Okay, one more pin, just a second, lock the collar, and the drill is loose. Come the core stems. Walking into a little 3 meter crater here, Tony, you can see. Really dig in when you go into those craters.

CAPCOM Man, that is a rocky place, isn't it.

DUKE Boy, my suit feels good.

DUKE (garbled)

PAO If the number of rocks on the surface are any indication of the number of rocks under the surface, Duke could have a difficult time drilling here.

YOUNG What.

DUKE I'm going to have to drill away from that crater. Tony, I'm about 4 or 5 meters away. Is that okay from that crater I described?

CAPCOM That sounds good.

DUKE Okay, we'll start drilling right here then.

DUKE Well, I don't think - there won't be any problem the only thing goes down past there is the LSM.

YOUNG That's what I thought and we may have to deploy the LSM out behind the ALSEP any way to get it from going down that little crater there.

YOUNG I think 54 will put me right in the hole. What do you think of that Houston if I deploy the ALSEP behind the - I mean deploy the LSM behind the (garbled) thing here? Can you all see this on the tube?

CAPCOM Standby a second, John.
DUKE You know, John, you need about 2 patches of Velcro. It'd hold the whole thing. You got about 95 - there it comes.
YOUNG Okay, (garbled)
DUKE Man, can you throw things a long way up here.
CAPCOM Okay, that's okay, John.
CAPCOM We understand you have deployed it almost due west of the RTG.
DUKE Right.
CAPCOM Okay, and we need about 30 feet between that heat flow hole and the LSM.
DUKE Understand. I'll give you that.
CAPCOM Very good.
PAO While Duke is getting ready to drill these holes John Young is setting up the central station in the passive seismic experiment.
DUKE Oh, finally got it, Tony.
CAPCOM Very good.
DUKE The other day I was worried.
DUKE Okay, I can stand it into the ground about - okay, are you guys ready, here we go. Mark. Hey, that beauty is going right in.
CAPCOM Outstanding.
DUKE Guess what?
YOUNG It is slowing down.
DUKE It's not going in. Something hard in there.
DUKE What ever it was, we got through it. Tony, it's speeding up again.
CAPCOM Okay, good show.
DUKE Right on down now. It's super now. It must have been a rock. I'm sure the regolith is covered with -
CAPCOM Very good Charlie.
DUKE Okay, and first the long stem is in.
YOUNG Golly, Charlie. Help me when you get finished.
DUKE Okay, that ain't going to work.
DUKE Okay, Tony, the foot mashy is not going to work.
CAPCOM Yeah, we were watching.
DUKE We'll have to use the wrench.
CAPCOM Okay.
DUKE That works like a champ.
CAPCOM Alright, that new wrench is pretty slick.
DUKE Yeah, it is.
YOUNG Why don't you open.
YOUNG Fall over drill.
CAPCOM Ah, Charlie, such form.

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DUKE (garbled)
DUKE How about that? I'm going out for the ballet
when I get back. You learn another line of work up here.
DUKE Hey, that was fantastic news about the
house passing the bill Tony. It really started a great day
today for us.
CAPCOM We sure agree.
DUKE Okay, bet you can't believe how happy I
am that went in there.

END OF TAPE

DUKE Hey, you can't believe how happy I am that
went in there.

YOUNG (garble) he is very happy.

CAPCOM Mark's pretty happy too.

PAO Mark refers to Dr. Markus Lansef the
principle investigator for this particular experiment.

DUKE There we go. Okay here we go second one.
Mark. Look at that beauty go. Look at that beauty stop.
Look at that beauty go again.

CAPCOM Okay give it time to clean the flute.

DUKE I'm not leaning on it. It may appear
that I'm leaning on it Tony, but I guarantee you I am
not.

CAPCOM Okay we understand.

DUKE Okay. It's run into something hard
down there. I can feel the torque, but whatever it is it's
going through it. Yes it was through it. It's probably some
just some rocks down there in the regolith, Tony. You know
it looks -- I'll bet it's just like the strata that fresh
crater we saw back near the LM.

DUKE Oh boy thank goodness for that wrench.
Never would be able to do that with a foot mashie. Here we go
again. Now it's home.

YOUNG Oh! Beautiful.

DUKE Okay.

YOUNG Almost got it.

DUKE Hey, John, it looks great. How can you
get that thing leveled out there?

YOUNG It isn't easy.

YOUNG Okay, it's level, but the Sun reading
is 064 and 1/2, is that okay, Houston?

DUKE Mark.

CAPCOM Okay, Charlie, say that again, John.

YOUNG 064 and 1/2. I pointed it at the thing
that said Sun, but that sure didn't do it.

YOUNG I guess you can handle that.

DUKE Tony, it bogs down as it goes down
through rocks and things. Man, it's getting really hard, it
is giving me a lot of torque, the third stem is just about
in.

YOUNG Okay, Hansen, switch 5 is clockwise.

DUKE Mark. I'll call it quits on that one
Tony.

DUKE Are you reading, Houston?

CAPCOM We copy that.

CAPCOM Okay, John, we understand you have the
skirt out.

YOUNG That's affirmative.

CAPCOM Okay.
 YOUNG Can't you see it on the TV?
 CAPCOM We are just now coming around there. Okay,
 that 064 will be fine then.
 YOUNG It ought to blind you.
 CAPCOM John, do you remember where the bubble
 was on the top of the CSE?
 YOUNG In the middle.
 CAPCOM Very good.
 CAPCOM I should have known.
 YOUNG Aaron said we couldn't come back unless
 we put the bubble in the middle. Oh, I was afraid of this.
 DUKE What wrong?
 YOUNG The - Charlie?
 DUKE What?
 YOUNG This thing pulled so hard that it pulled
 the central station.
 DUKE Yes.
 DUKE Can't you realign it later?
 YOUNG Yes, that's a thought.
 DUKE That was my problem with the RTG
 package, I -
 YOUNG There it's okay. There is just that
 first bunch that we didn't get.
 DUKE Yeah. Okay, Tony, I now have the
 right handed rammer. And Tony I put this one all the
 way into the red mark on the Cayley Plain.
 CAPCOM Outstanding, first one in the highlands.
 YOUNG Ask him what we are going to do if the
 temperature shows like it does at Hadley?
 DUKE Okay, the second one the thermal cover
 is in to the second red mark and Tony the - the probe is
 out of the ground up to B 8 - right on the line between
 B 7 and B 8.
 CAPCOM Okay, Baker 7 and 8.
 YOUNG Charlie.
 DUKE What?
 YOUNG Something happened here.
 DUKE What happened.
 YOUNG I don't know. Here is a line that
 pulled loose. Uh oh, what is that. What line is it?
 DUKE That's heat flow, you've pulled it off.
 YOUNG I don't know how it happened. Is it
 pulled loose from there.
 DUKE Yes.
 YOUNG God almighty. Well, I'm wasting my
 time.
 YOUNG Gosh I'm sorry, I didn't even know
 it.

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YOUNG	Gosh it's sure gone.
CAPCOM	Did the wire or the connector come off?
YOUNG	It broke right at the connector.
DUKE	The wire came off at the connector.
CAPCOM	Okay, we copy.

END OF TAPE

YOUNG Well, I guess I can forget the rest of that
heat flow.

DUKE Now, if I go do the -----Ah, RATS[

YOUNG I'm sorry, Charlie. Goddamn you know it.

DUKE I know you are.

DUKE A bunch of spaghetti over there.

CAPCOM Boy, we can sure see that on TV. It looks
like a mess[

DUKE Well, tell Mark we're sorry. There's no
way we can recover from that, Tony?

CAPCOM I'm sure we're working it.

DUKE Do I go over and get the ---

CAPCOM So we understand that the cable came off
the connector, and we've got just the free end of the cable,
is that right?

YOUNG Right.

DUKE That is right.

DUKE Okay, Tony, starting on the deep drill.

DUKE Mark.....Mark -- that one went in like
gangbusters[

CAPCOM Okay, we copy that Charlie, and hold back
on that drill a little bit, it'll probably try to auger in on
you a bit.

DUKE Okay, I will. Yeah, that penetration rate
was a little fast. Thanks for reminding me. Tony, if there
is some way we can get that connector off of there, we might
be able to take the whole -- the electronics -- naw, we can't
do that either, the whole thing's hooked up.

YOUNG Okay, the LSM is on the surface I'm going
to deploy the central station.

CAPCOM Okay.

PAO This is Apollo Control. The crew has now
been on the lunar surface a little over two and a half hours,
and from Charlie Duke's description, it sounds as if the cable
from the heat flow experiment to the central station is broken
at the connector. If that, in fact, is the case, that experi-
ment could not be recovered. We would go ahead and drill the
deep core hole, using the lunar surface drill.

YOUNG These wires have -- they have live memory
in them, and they just -- they stay crinkled up in odd manners
here. I didn't realize that.

CAPCOM Roger, John, we can sure see that.

DUKE Hey, Tony, I had a tough time getting the
bit off of the first stem. It got a little dusty in there,
but I got it cleaned out.

CAPCOM Okay.

DUKE ah--oh[

YOUNG What Charlie?

DUKE Fell down.

APOLLO 16 MISSION COMMENTARY 4/21/72 121:33GET 1:17CST MC-451/2

DUKE There we go.

DUKE I bet ya that looks like a comedy of errors
on the tube, (garble) got a little dusty.

CAPCOM Ah, you're coming along fine there, Charlie.

DUKE The problem is -- that the bit won't stay
stuck in the ground, and when I try to get this stuff on it
sends the whole deal, instead of the --

CAPCOM That's a new one.

END OF TAPE

DUKE That drill is so good it's hard to get
off.

CAPCOM Right.

DUKE I mean not the drill but the bit, the wrench.
Okay second one going in, Tony, mark.

CAPCOM Right, don't hurry it.

DUKE I'm holding back on it this time.

CAPCOM Good show.

DUKE Mark. Okay, the second one went in
with no problem, Tony.

CAPCOM Good show.

DUKE Man what a place.

YOUNG Okay, the central station is erected.

CAPCOM Okay. And you're go for the shorting switch
when you get there.

DUKE Okay. That baby just doesn't want to come
off. Okay last one going off, Tony.

CAPCOM Okay.

DUKE And we'll see if we can get that beauty
out of the ground.

CAPCOM Ah, think positive, Charlie.

DUKE Boy, that's all -- all the sections are like
that first one. Pull it right out of the ground, but I don't
think that's true.

YOUNG Say this isn't the cleanest place I've ever been
in my life.

DUKE Ooh, dust is every where. Okay, last one,
Tony. Mark.

CAPCOM Okay.

DUKE I feel a little, little clutch slippage but
not much.

CAPCOM Okay, just take it slow and easy.

DUKE Slowly going in. But I'm doing -- let
it do the work.

CAPCOM Right, Charlie, your number is spin it 3 -- spin
it 3 for 15 seconds without letting it go down if you can.

DUKE I am, I was just going to see if I was
down far enough.

CAPCOM Okay.

CAPCOM Beautiful. Don't strain yourself there,
Charlie.

DUKE I'm not. I think I better use the jack.

CAPCOM Okay.

DUKE When I was -- when I was spinning it free
Tony, I felt like it was going to come right on out, but it
sort of hung up now.

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 1:26 GET 121:44 MC-452/2

CAPCOM Okay, we understand --

DUKE I got it down about 1 stem width and a length.

CAPCOM Okay.

PAO Duke, is using a jack to assist in pulling
that 9 foot core out of the lunar surface.

DUKE For some reason that thing is hard to screw.
There we go. Hey, Tony, I'll save the drill just in case we
can you all can come up with an answer on that heat flow.

CAPCOM Okay.

PAO the picture we're showing right now is of
John Young, working at the antenna at the central station.

CAPCOM And, Charlie, when you get that core out
we would like you to measure the hole with the rammer jammer.

DUKE Yeah, I am. Okay, right in here, Tony, we
really sink in on that rim of that little crater. How's your
T.V.

CAPCOM Excellent, outstanding.

DUKE Good.

CAPCOM And if you get tired there Charlie, just
take a break.

DUKE No, I'm -- I feel good. Don't know how good I
look.

END OF TAPE

YOUNG Hey, Houston I think the antenna is aligned and pointing at you.

CAPCOM Okay, John.

DUKE And it's level believe it or not.

PAO We'll check to see that we're getting data from the passive seismic experiment before the other two experiments, the magnetometer and the active seismic are set up.

DUKE (Laughter) If the boss says that, I agree with him. yes sir.

YOUNG Okay, Houston we're going to push the start switch.

CAPCOM Okay.

YOUNG Okay, the amp goes to zero on the gauge is that what it's suppose to do?

CAPCOM That's affirmative.

YOUNG Switch 1 is going clockwise - switch 1 is going clockwise. Switch 5 is going counterclockwise.

DUKE Okay, Tony the top of the core deep core has got cap number A.

CAPCOM Okay, deep core tap A. And John, we've got a good ALSEP.

YOUNG I knew it was a good one, gee whiz. Okay, I'll point it to the left of here.

PAO We're looking at Charlie Duke, now beginning to jack the a ...

DUKE Well, you can't believe it Tony, but that beauty is coming out.

CAPCOM Outstanding. And we've proved the lever principle again.

DUKE Yes.

PAO The jack was added to the compliment of lunar surface tools after Dave Scott had such a difficult time removing this deep core on Apollo 15.

DUKE Stuart, hey I've learned something I'm letting the suit do the work for you.

CAPCOM Very good.

DUKE On this beauty.

CAPCOM Looks like it's a good thing we had that jack.

DUKE I think so. I think maybe John and I would have been able to pull it out but it would have been a battle.

CAPCOM Hey, Charlie take it easy let's rest for a minute.

DUKE Okay, how's the old heart beat.

CAPCOM Oh, you are up to about 140.

DUKE Okay, doesn't feel like hard work. Still can't pull that beauty out. I got it out 6 feet.

DUKE John, is that going to be alright next to that rock?

YOUNG I don't have any idea, Charlie. Sure hope so because there isn't much other place to put it. May next to the rock there is going to be a hole right next to it.

DUKE Yes, I see what you mean.

YOUNG This isn't the worlds greatest place to put a ALSEP I'll tell you that.

CAPCOM Hey, John, how far are you from that rock?

YOUNG It's about 3 feet. Do you want to move it farther than that? How far do you want it to be? I'll pick it up and move it.

CAPCOM Okay, we're thinking about that.

CAPCOM John, I guess they would like you to try and move it away from that rock and on the distance just as far as you can without getting it in trouble there. Could turn it around.

YOUNG Okay, can I pick it up by its arman if I promise to be real careful with it?

CAPCOM Okay, they have reevaluated the whole thing and decided since you left it I guess they didn't want it very badly and they said just leave it where it is looks fine.

YOUNG Okay, I can probably get down on my knees and get underneath its little box.

CAPCOM And Charlie.

DUKE Yes.

CAPCOM On that hole there instead of putting the rammer jammer down I guess we would like to put the second heat flow probe down in the hole and then measure it with the rammer jammer how far it went and just leave the heat flow probe in the hole. Does it reach over there?

DUKE The probe?

CAPCOM That's right the heat flow probe.

DUKE The - no I don't think it will reach, Tony.

CAPCOM Okay, then just go ahead and measure the hole.

DUKE Ya'll going to give up on the heat - are you going to give up on the heat flow?

CAPCOM Well, we probably have to haven't got a firm decision, yet.

DUKE I'd like to save that stuff until you make a firm decision.

CAPCOM Okay. By putting it down in the hole they were going to use it for heat flow hole.

DUKE I'd rather drill one. I don't think it will reach. I'll try it.

YOUNG Okay, (garble) - this gem is leveled

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 1:36 GET 121:54 MC453/3

YOUNG and aligned. The front is right in the middle of the shadow.

CAPCOM Okay, we copy that John, very good.

YOUNG And the film is right in the middle of the alignment mark.

END OF TAPE

YOUNG Hey, that sun is right in the middle of the alignment mark.

CAPCOM Okay.

DUKE How about that, Tony,?

CAPCOM Outstanding.

DUKE Did you see that?

CAPCOM I see the hole stayed open.

DUKE All the way down I just dropped the rammer into it -- it just fell in.

CAPCOM Okay.

DUKE Look at that.

YOUNG Okay, Charlie, we're about ready to go with the geophones here.

DUKE Wait a minute I got the most beautiful thing here I got to pick this up before I lose it.

CAPCOM Blow on it.

DUKE Huh?

CAPCOM Blow on it.

YOUNG What did you say, Tony?

DUKE Yeah, we're going to.

YOUNG Come on, Charlie.

DUKE I'm coming. Let me put this over here.

PAO The drill core that, Charlie's, carrying back to the Rover, hopefully is full of about 9 feet of a cross section of the lunar surface material. On Apollo 15 a similiar core had material in the bottom of it which was laid down on the surface about 500 million years ago.

DUKE Tony, on the rim of that little crater as I walked through there, there was a -- underneath the regolith there was a white area, I kicked up some very white soil, about 3 centimeters down.

YOUNG I forgot the camera.

DUKE Roger.

Young Here, Charlie, I got it.

DUKE Okay, I get it, let me have it.

YOUNG Woa, Charlie, huh.

DUKE How's that?

DUKE Watch out for those cables.

YOUNG Okay, I am. (laughter) that's pretty good.

DUKE Okay, Tony, I put the stuff the geophones stake in, by just pushing on it about, oh, about a foot. Ya'll better to think about that 210 cone penetration, it stopped 10, it looks like the 5 would be the best all the way out. I think I'll just go right up to the hill with it too.

CAPCOM Okay, we copy.

YOUNG Watch out, Charlie.

DUKE Okay, I was just waiting to get the dumb heat thing.

467/1, 2, 3
468/1, 2
469/1, 2
467/1, 2, 3
468/1, 2
469/1, 2

DUKE Dumb things just stand up. The wires every-
thing just stands up off the ground about 6 foot -- 6 inches, here.
YOUNG Foot -- never thought of that -- we should --
hey, never thought of that.
DUKE Okay, I got it.
YOUNG Still be the trick of the week. Get it
Charlie. Not only does he have the geophones in the ground,
he's got it buried in the ground.
CAPCOM Super.
DUKE Okay, this is going to be a lot easier than
carrying that big -- other back pack.
YOUNG Keep an eye on this, Charlie.
DUKE I got you.
YOUNG Okay, now I'm going out and parallel these
tracks.
YOUNG Okay, let me make sure--
DUKE You want the hammer?
YOUNG No go ahead I just want --
DUKE You don't need the hammer -- we don't need
the hammer.
YOUNG I know it. The other stake is over there.
DUKE Oh, okay, in that, in the pallet?
YOUNG Yeah.
DUKE Okay, I'll get it. Sound like the camera
remodeing.
YOUNG Yeah. Make sure that it's not pulling too
hard on that wire back there.
DUKE No, it's great, John.
CAPCOM Ah, Charlie, I think you need a camera.
DUKE Yeah, I'm going to get one. I'll go run
get it now.
YOUNG No, Charlie, watch and see where this line
comes out.
DUKE Okay, I'd better do that, Tony. I'll get
the camera.
CAPCOM Okay, fine.
DUKE Just a minute, okay?
CAPCOM No hurry.
DUKE We know we need a -- okay you're walking a
little bit sideways, John, you're pulling against it with your
left side. There you go. Looking good, John, the geophones
still in and the stake is looking good. Doing great.
YOUNG Don't lose -- average guy doesn't know
realize how far a 100 meters is.
DUKE I know it.
YOUNG Especially me.
CAPCOM Roger. 2 inches at a time like that, it's
a long way.
DUKE Ah, the footprints in the Moon. Can't
believe it.

CAPCOM Ah, that's alright they'll probably erode
away in about 4 billion years.

DUKE The regolith --

YOUNG What's that, Charlie?

DUKE What's what?

YOUNG That thing hanging up there?

DUKE No it's okay. Man that's a long way, John.
Stake is still up.

YOUNG Okay.

DUKE Keep going. Hey, there's --

YOUNG There's a double one.

DUKE There's a double one. Run around and get
in front of you here.

YOUNG There they come.

DUKE There they come.

YOUNG Here we are.

DUKE Okay, here we are.

YOUNG Got it?

DUKE Wait a minute.

YOUNG Okay. Charlie, we have to put that in before
we put the stake in.

DUKE Yeah, I can't do anything till we get that
in.

YOUNG Come on. Guess what? Beautiful, Charlie.

DUKE Okay, that one is buried too, Tony.

YOUNG Charlie, buried the geophones.

CAPCOM Okay.

YOUNG (garble)

DUKE (garble)

YOUNG No that's right.

DUKE You wanted this way, don't you?

YOUNG that's right.

DUKE (garble) fine.

YOUNG Well cut the line.

YOUNG No it's alright.

DUKE You're probably about to.

YOUNG Yeah, right.

DUKE Get the flag open, so we can see it.

YOUNG Yeah.

DUKE Okay, I'm going to get a camera, you all set?

CAPCOM Yep.

DUKE Watch out, you got it crooked, John. Right
here on this side, your right.

YOUNG Yeah, okay thank you.

DUKE Yes, sir. About to get it again. There
you go. And the stakes holding fine. Adios.

YOUNG Adios. It's a far cry from that --

DUKE Hey, John, you got to wait. They got to
change out your air hose.

YOUNG Early.

DUKE Where is it? Hey, Tony, where is the
Bendix air compressers?

CAPCOM It doesn't look right with them not up there.

YOUNG I'll tell you this 1/6 gravity feels a lot
better.

DUKE Tony, when I first started with that jack
I thought the thing -- the ground was so soft I thought the thing
had failed like it did in the last training but it had not, it
just worked great.

CAPCOM Outstanding.

END OF TAPE

DUKE How about that tape, huh?
DUKE --gummit!
YOUNG Well, I'll say one thing the force to
deploy this thing I can sense it's exactly the same as it
was in one G -- I keep wondering when the power wire is
going to bust.
DUKE Okay, Tony, I have LMP's camera.
CAPCOM Okay.
YOUNG The back of the bottom of the bit is
with BRAVO --
DUKE John, I'm going back out and take some pic-
tures.
YOUNG Alright.
DUKE John has disappeared over the horizon.
Hey, John, how about an EMU status check -- you just pulled out
your pin on your purge valve.
YOUNG I'm -- doing okay -- MD 50 60 70 3% is what
I read.
DUKE Okay, well you must -- you still must be
locked. Uh, your pin's out and I'll put -- I picked it up and
we'll put it back -- it's under your seat.
YOUNG Okay.
DUKE Right next to the Rover.
YOUNG Okay
CAPCOM Charlie, we would like for you to put John's
pin back in.
DUKE Alright, I'll go get it, just a moment.
PAO -- out instrumentation and communications
officer reports that the dropout in video is due to a line
problem between Houston and Madrid.
DUKE Okay, Houston, ready for a first ALSEP --
it's set on 0 we'll go to 1 -- ready for the first geophone
to fire. Are you all set for that Houston?
CAPCOM Standby one.
YOUNG No.
DUKE Tony, the PSE skirt has some dust kicked
on it on the north side a little bit --
YOUNG Blow it off, Charlie.
DUKE Oh, I can't do that.
CAPCOM Okay, I guess we're going to have to have
you stand still for a little bit here while we calibrate some-
thing. While you're doing that, how about an EMU check, and
did you get that pin back yet?
YOUNG I'm a hundred yards from Charlie.
CAPCOM Understand.
YOUNG That's a hundred meters.
YOUNG Three point 8 5 is -- I'm between minimum and

YOUNG intermediate on the cooling. I got 73% and no flags. You want me to run on back to Charlie and get that?

CAPCOM Negative.

YOUNG He must have pulled out on the geophone, somehow. Where did you pick it up, Charlie?

DUKE Right next to your -- the Rover.

CAPCOM Okay, John, we're ready for the summary.

YOUNG You mean yours.

DUKE No, it's yours.

CAPCOM Okay.

DUKE Okay, Tony, I got 60%, I'm all clear, my pressure gauge is, on the flags, and my pressure gauge is 38.

YOUNG Okay, Charlie, hold still.

DUKE I'm still.

YOUNG 4, 3, 2,], fire -- Ah, ha, ha, -- fixed that[

YOUNG Okay, Charlie, hold still.

DUKE Okay.

YOUNG Number 2, Houston. 4, 3, 2,], fire -- not -- better try it again. 4, 3, 2,], fire, fired. Okay, Charlie.

DUKE Okay.

CAPCOM Hey, John, we got an outstanding signal here, it looks great[

YOUNG Okay. It's shaking the ground. Number 3, Houston, it's shaking the ground. Number 3, Houston, --

DUKE I'm steady.

YOUNG 4, 3, 2,], fire.

CAPCOM Roger, you got a beauty there, John.

YOUNG Okay, Charlie.

YOUNG Going 4, Houston, 4, 3, 2,], fire.

CAPCOM Uh, Charlie, when you get a minute there, we got a couple of questions.

DUKE Go ahead.

CAPCOM We would like for you to look at the end of that heat flow cable that was broken off, and tell us how far from the heat central station it broke, and also describe the end of the broken cable -- if you can get that in between when John's walking.

DUKE Hey, John, stand by a minute, let me stand up here.

YOUNG Okay, Charlie, number 5, Houston. You ready to go still Charlie?

DUKE No, wait a minute, let me get up and then I'll hold still.

DUKE Okay, go ahead.

YOUNG Okay. 4, 3, 2,], fire. Sound doesn't travel too good in a vacuum, I don't hear a thing, but it jumped.

YOUNG Okay, Charlie, I'm going to the next station now.

DUKE Okay, Tony, the -- I'm going to be still
John, so you just go ahead.

YOUNG Okay, number 6. 4, 3, 2,], fire.

DUKE Okay, Tony, the cable is broken off right
at the connector. And there's about an inch and a half of sil-
ver material right in my hand at the end of the broken piece,
and as I look at the cable it's right at the -- the connector,
rather, it's right at the connector -- broken off right there,
over.

CAPCOM Okay, we copy that.

YOUNG Number 7, Houston.

CAPCOM How does the connector look? Is there any
damage on it?

DUKE Okay.

YOUNG 4, 3, 2,], fire.

DUKE Tony, there's no damage on the connector,
over.

CAPCOM Okay.

YOUNG Number 8, Houston.

END OF TAPE

YOUNG 4, 3, 2, 1 fire.
YOUNG Okay, am I holding still long enough?
CAPCOM Yep.
YOUNG Number 9, Houston. 4, 3, 2, 1, fire.
CAPCOM Okay.
DUKE You know as I look up to Smoky Mountain,
you can see some large blocks up on the flank of Smoky Mountain.
It, on the face, it's the side next to the south, the North
Ray crater.
YOUNG Number 10, Houston.
YOUNG 4, 3, 2, 1, fire.
YOUNG Hey, Tony, did you get my question about am I
holding still long enough?
CAPCOM Yeah, you're holding still long enough.
YOUNG Okay.
DUKE Are you moving, John?
YOUNG Yeah.
DUKE Okay.
YOUNG Houston, do you want - answer me, do you
want me to do one by the geophone, or do I skip that one?
The central geophone. There's a white thing by it.
CAPCOM The one right by the central geophone, yes
we do want.
YOUNG Okay.
CAPCOM The one we don't want is the next one
around the cable.
YOUNG Yeah, I remember now.
DUKE Wait a minute, John.
YOUNG Okay.
DUKE Okay.
YOUNG Houston, 4, 3, 2, 1, fire.
CAPCOM Okay, we're sure getting a good signal
here, John.
YOUNG Okay, the next one we skip because it has got
a black wire on it.
YOUNG Hey, number 12, Houston. 4, 3, 2, 1; fire.
YOUNG Number 13, Houston. 4, 3, 2, 1, fire.
DUKE It's firing, Babe, I'll tell ya.
YOUNG Good.
DUKE Getting me all dirty.
CAPCOM Great. Not great you're getting all dirty,
great it's working.
DUKE Okay, Tony, one of the arms of the LSM,
when I pull the sun shade, the arm to the northwest does not
lock.
YOUNG Well, lock it Charlie.
DUKE How do you do that? By pushing down?

CAPCOM Charlie, they don't lock.
 CAPCOM No, it doesn't lock. They don't lock.
 DUKE But I can't unravel the Sun shade, it
 pulls up the arms. Go ahead.
 YOUNG Okay.
 CAPCOM If you can't get that out there, leave the
 Sun shade down.
 YOUNG Okay, 4, 3, 2, 1, -- Number 15, Houston.
 CAPCOM Okay.
 DUKE 4, 3, 2, 1, --
 CAPCOM Charlie, I guess we'd just like you to
 leave the Sun shade alone, just let it hang there.
 DUKE I got it. It was wrapped around - a
 couple of times. I didn't touch the little bit level. It's okay.
 CAPCOM Okay.
 DUKE Wait a minute, John. Okay.
 YOUNG Okay, number 16, Houston.
 DUKE 4, 3, 2, 1, fire.
 DUKE Okay.
 YOUNG Okay, number 17, Houston.
 DUKE Just a minute, John.
 YOUNG Ready, Charlie?
 DUKE Yeah, go ahead.
 YOUNG Okay, number 17 again, Houston.
 CAPCOM Okay.
 YOUNG 4, 3, 2, 1, fire.
 DUKE Okay.
 CAPCOM And Charlie, while you're taking the
 pictures and all verify the area around the central station is
 policed up.
 DUKE Okay, I will.
 YOUNG Number 18, Houston.
 YOUNG 4, 3, 2, 1, fire.
 CAPCOM And we're still getting good signals.
 YOUNG Okay. Coming up on the last one. And I
 see the black thing, we're skipping that one. Going up here
 by the central station. The 5 at the white line next to the first
 geophone.
 CAPCOM Okay, and after you fire this one, we'd
 like you to stand still until we give you the go.
 YOUNG All right.
 DUKE Wait a minute, John. Okay, go ahead.
 YOUNG Okay, Houston, last one. 4, 3, 2, 1, fire.
 PAO That's the last of 19 thumper charges.
 CAPCOM Okay, you can go.
 YOUNG You got to be kidding.
 DUKE No kidding.
 YOUNG Does the signal reverberate that long.
 CAPCOM Right. It really rings down.
 DUKE All finished. Good show. Tony, ain't
 there some way we can fix that heat flow?

END OF TAPE

DUKE Tony, ain't there some way we can fix that heat flow?

CAPCOM Looks pretty bad there, Charlie, we suggest you just not worry about it there. You got a good ALSEP and the other experiments are working fine.

DUKE Now that -- all those hours. Okay, we got all the pictures except the ones John's, supposed to take of the mortar package. And I'm skipping the heat flow ones. And we're up to magazine we're 100 -- 102 a 101 on magazine Alfa.

CAPCOM Okay.

DUKE Okay. I'm going to get the hockey stick, John.

YOUNG Okay. I'm going (garble) 5 (garble) counterclockwise here to make the beast.

CAPCOM Okay, Charlie do you have that pin in John's suit yet?

DUKE I'm going to get it right now.

CAPCOM Okay.

DUKE Coming your way.

CAPCOM Rog. Seeing you coming.

DUKE What's the heart rate when I'm going like this, Tony?

YOUNG About 10.

CAPCOM Okay, you're going about 110 right now.

DUKE Am I? Thank you.

YOUNG Well what's mine?

CAPCOM John, your about 80.

YOUNG That figures.

DUKE See that right there, Tony?

CAPCOM Yep, sure do.

DUKE Okay, the (garble) station is all cleaned up.

CAPCOM Good job.

YOUNG All the junk is gone somewhere.

DUKE Did you see what I held just in front of the camera, Tony?

CAPCOM Yeah, we sure did.

DUKE It was a solid piece of glass, spherical, and part of it's broken away, but it really, really the most unique piece of glass I've ever seen, in all the samples.

YOUNG I think--

CAPCOM Outstanding, Charlie, I thought you had the ball on that OPS or that purge system.

DUKE No, it's a solid piece of glass.

CAPCOM Fantastic.

DUKE And it was right out here by the drill.

YOUNG Okay, Charlie, I'm going to deploy this

DUKE Okay, wait a minute, let me get this thing

DUKE in and I'll go back and start on that heat flow. I mean the -- can you step away so I don't get these cables?

YOUNG What is it you want to do.

DUKE I got to get this in.

YOUNG Oh. Gosh, it is it, isn't?

YOUNG Yeah, (garble) is what I'd like to know.

YOUNG Manual dexterity test of the year.

I'll bet --

DUKE Can't see it.

YOUNG I'll bet I -- when I undid my seatbelt I pulled it off.

DUKE Probably.

YOUNG I'll bet you a 100 dollars.

DUKE Okay, Tony, that is back in the commander.

CAPCOM Good show.

DUKE These Rover tracks are amazing. They just barely -- oh, ack. Gah.

YOUNG My gosh, Houston, even though we were over the hill the thing is within about a foot of being lined up.

CAPCOM Outstanding, John.

YOUNG And for the geophones to be in the same line it'll have to go with a sun angle of 3 33.

CAPCOM Okay.

YOUNG I need the thumper package, excuse me.

DUKE Boy, that beauty almost didn't want to come lose, Tony.

YOUNG We got it.

PAO John Young is now setting the mortar package on the base plate.

CAPCOM Uh, Charlie, what was the cap on the bottom end. We missed that.

DUKE Baker.

CAPCOM Okay.

DUKE It's all full, Tony.

CAPCOM Outstanding.

YOUNG Okay, Delta and Baker on the bottom. You're losing a little bit out of the 3rd section here. Get the cap on.

DUKE And Echo is on the bottom of the 3rd section. Over.

CAPCOM Okay, we copy that.

YOUNG Man I sure feel weak. Getting this wrench off of here.

DUKE Am I in focus right here, Tony?

CAPCOM Yeah, you look fine.

DUKE That's amazing, that camera is so good.

CAPCOM The lens must be like a pin hole camera.

DUKE Yeah, Okay, I'll go put these stobs, these cores back out there.

YOUNG And I'm unable to get one of the legs

YOUNG of the mortar package deployed here for
some reason.
DUKE Okay, Tony, do you want me to save the drill?
CAPCOM Yeah, why don't you just leave it setting
there.
DUKE In case you guys come up with something.
DUKE Okay.
YOUNG Boy am I selfish.
DUKE Okay, John, I'm going to start configuring
over here for some geology.
YOUNG Okay.
DUKE And I'll ah --
YOUNG be there as soon as I can, Charlie.
DUKE Put your bags on and etc. etc.

END OF TAPE

YOUNG The reason I can see why I can't deploy this third leg, but I can't seem to do anything about it. Would you take two out of three legs?

DUKE You want me to come help, John?

YOUNG Well Charlie it's a question, I can't get this gear around this angle in here. I mean I don't know how it got the way it is, but unless I got it around the angle it won't deploy.

CAPCOM Which leg was it, John?

YOUNG The third leg on the mortar pallet. Would you take three out of four.

CAPCOM Well, if it won't come out I guess we're stuck with it.

YOUNG Well, I don't see anyway with my glove - if I took my gloves off I could get it out, but I ain't going that far.

CAPCOM Okay, we'll just go with three, John.

DUKE Sure I can't help John.

YOUNG No, there's nothing we - you can do unless we could pull it. It won't come out and there is no way to pull it without a screwdriver.

DUKE No we haven't got one of those.

YOUNG No, three out of four will work.

DUKE They ought to be satisfied with that.

CAPCOM Yes, John we're satisfied with three let's just go with that.

YOUNG Okay. And going in the ground at 333.

YOUNG Okay, the mortar pallet is in and flat, and the level is still - shoot, it's now about 3 - between 3 and 0.

CAPCOM Okay, John.

DUKE Okay, Tony, I'm going to get a couple of grab samples out here in front of the rover about 15 feet. Look like a typical rock that are in this area. There mostly dust covered here, but I can pick up a couple that are whiteish and I can get a couple of cross suns before.

CAPCOM Sounds good, Charlie.

YOUNG Okay, mortar package is in place - oh, dear. The mortar package - the pallet is level. The mortar package is not quite level it's just off the edge of being level.

CAPCOM Okay, understand. The bubble is free of the case, though?

YOUNG Yes, it is.

CAPCOM That's fine.

YOUNG Reasonably enough.

YOUNG Okay, I'm going to raise the radio antenna at Flag.

YOUNG and it's up.

CAPCOM Charlie, you might want to slow down a little bit.

DUKE Yeah, I am. My problem was I fell down and
with this camera on it's hard to get up. I'm okay.
CAPCOM Okay.
DUKE I can't believe how full of holes this
place is, that is a general comment.
YOUNG You got the camera, Charlie?
DUKE Heck no, it's on the central station.
YOUNG I remember the last time it was on the central
station it collapsed and then you left it over to core.
DUKE Okay, bag 351, Tony has got a grab sample.
CAPCOM Okay, and John after ...
DUKE And, I wouldn't even take an after for you'll
never ...
CAPCOM After taking pictures of the mortar
package there we would like a picture of that last thump
imprint.
YOUNG All righty.
CAPCOM I'm sorry Charlie ...
DUKE Oh my first rock, Houston, I was just saying
my first rock, even though I had to fall down to get it.
DUKE Tony, I'm taking this lens brush and
cleaning off this camera.
CAPCOM Okay.
YOUNG Charlie, this camera here is kind of
dusty.
DUKE Well, I think it's just the outside I
looked at the lens it looked clean.
YOUNG Yes, I think this one ...

END OF TAPE

DUKE Hey, the lens in this one is clean too, good.
YOUNG I can't believe this dirt.
DUKE Okay, what settings do you want on that
Houston.
CAPCOM Normal cross sun.
YOUNG You want us to stay up here?
CAPCOM That'd be fine.
DUKE (cough)
CAPCOM You okay?
DUKE (cough) old orange juice went down wrong.
YOUNG Boy --
DUKE Johnny, I'm going over to this crater, and
get you some of this white soil. I think it is coming off of
this rock here, but it looks like kollegie. I never thought
I'd use that word up here, but that's what the coating looks
like. Right here. Right here.
YOUNG Let me see them --
DUKE Come here and look at it, John. It might
be just a total white rock, it, the cross sun, oh, man, you're
sitting something terrible.
YOUNG Where did ya see it?
DUKE See it -- right there.
YOUNG Yeah.
YOUNG Now we've had a bag failure -- already, that
thing. The little pull tab came off, we can still use it though.
Here, hold this for me.
DUKE Okay.
YOUNG Charlie, you got my camera?
DUKE Yeah, and it's filthy.
YOUNG -- get a little shovel full of that stuff --
Gosh, Charlie, it does look like kollegie.
DUKE Doesn't it look like kollegie?
YOUNG Yeah, but it's just a bunch of white frags,
I believe.
DUKE I'm going to get this rock here, too.
YOUNG You want me to put that in there?
DUKE No, go ahead, I'll get another bag for that.
YOUNG I feel ill-equipped to help you here.
YOUNG Okay, that sample of white material is going
in bag 355, Houston.
CAPCOM Okay, bag 355.
DUKE Hey, John, I got your picture.
YOUNG Charlie, what are you doing with the dirt?
You just threw it all over yourself.
DUKE I didn't mean to -- the rock fell out.
YOUNG You got to clean off your lens -- my lens
before we can start here.
DUKE No, I cleaned it off already.

YOUNG Okay.
 DUKE Okay, Tony, it's a white matrix in this
 rock with some glass -- it's a one rock breccia. One of the
 glass just fell out. But it really looks like a kollegie
 matrix. Uh, sort of fliable.
 YOUNG Come on, Charlie.
 DUKE What do you mean, "come on?"
 YOUNG Oh...what do you want to do with these sam-
 ples?
 DUKE Put them in this HTC right here.
 YOUNG Okay. This number 2 one?
 DUKE Yeah.
 YOUNG That's the one that's going on somebody's
 back.
 DUKE Eh?
 YOUNG I've got the cord to that, so it probably
 goes on your back.
 YOUNG Okay, Houston, the geology config here.
 DUKE How are we doing on the time line, Tony?
 CAPCOM Okay, you're just about right on.
 DUKE Okay, this white rock -- that I picked up
 is in bag 373.
 CAPCOM Okay, 373.
 DUKE It really works when you split them up,
 Tony, it's great!
 DUKE Okay, John, I got to change the mag on my
 camera, can you give it to me?
 YOUNG Affirmative.
 DUKE What are you going to do -- clean me off?
 or clean off the old camera?
 YOUNG Naw, I gonna clean up the camera. Wait
 a second, let me put this down -- down right here. Okay, I
 wanted to clean the camera off too. Get that dust out of there,
 cr we'll never get the mags in.
 DUKE Hey, thanks, how about cleaning yours off
 too -- yours has got really filthy --
 YOUNG Did you change your mag on it?
 DUKE Huh? No, just dust it off. Can you get
 my gloves a minute, John?
 YOUNG Can I get your gloves?
 DUKE Just clean 'em a minute.
 YOUNG There you go -- just to get that loose stuff
 off. Okay.
 DUKE Okay, that's good, thank you.
 DUKE Hey, Tony, magazine alpha is going out with
 110.
 CAPCOM Okay, copy that.

DUKE Dust everywhere, John!
 YOUNG That's what they say, Charlie.
 DUKE Your magazine Golf is going on at frame
 count 2.
 CAPCOM Okay, Golf 3 --
 YOUNG -- but there's a film on the
 lens, though.
 DUKE I know it.
 YOUNG It's nasty.
 DUKE Third blow, Tony.
 DUKE Okay, Golf, runs.
 CAPCOM Okay.
 DUKE Everything's looking good.
 CAPCOM Very good.
 YOUNG Okay, Charlie, which bag do you want?
 DUKE Uh, I got to get -- there's a set of bags
 over here --
 YOUNG Okay, 65, 66, 67, 68, I'll get you one.
 DUKE I'll get 'em -- they're already -- I got to
 load you up.
 YOUNG Okay, did you get these cap dispensers --
 you don't -- we don't need those, do we?
 DUKE I put 'em in there on the -- I think we got
 two core tubes.
 YOUNG That big rock right there is a breccia --
 look at all those glass in there.
 DUKE I know it -- most of them in here are brec-
 cias.
 YOUNG I picked up one.
 DUKE Yeah, that's about a 2 rock breccia there.
 Okay, I see you on this side. John, did you know you lost your
 little plate? Uh, Tony, on that one bag dispenser that -- on
 John's camera -- the little ring came off of it and the bag is
 just dangling loose, but we'll be able to use it still.
 CAPCOM Okay.
 YOUNG Oh me, look at that.
 DUKE What? Look at what?
 YOUNG Come here and help me get this bag up here.
 DUKE Oh, I'm sorry, I thought you wanted me to
 look at something.
 YOUNG It would be easier to do that without the --
 did you fall down, Charlie?
 DUKE Yeah, I fell down. Sorry.
 YOUNG I believe it.
 DUKE I'm filthy, huh?
 YOUNG Yeah, can you bend over pretty good?
 DUKE Yeah, there we go. How's that?
 YOUNG -- we got to walk this way a

YOUNG little here, so I can bend over without
bumping into the Rover (garble).
YOUNG Boy, ---
DUKE That's what I tried to do, and that's when
I fell down.
YOUNG Oh.
DUKE Let's see, the area is pretty well policed
up over there, when I come back to get the core tubes I'll
pick it up.
YOUNG I can do that good too.
DUKE Good, it's a good place to do the gran prix
out here -- you could pole vault yourself right over to Stone.
CAPCOM Okay, understand.
DUKE Tony, looking upsun towards the eastern
part of Stone Mt., you cannot see those lineations, but
as we look across sun those lineations are there --
YOUNG Think those are some, Charlie?
DUKE Yeah, and they trend sort of upslope to the
northwest, or to the --
YOUNG Okay.
DUKE Got it?
YOUNG Got ya.
DUKE Okay.

END OF TAPE

DUKE Tony, looking upsun towards the eastern part of Stone Mountain. You can't see those lineations, but if we look across sun, those lineations are there.

YOUNG (garbled) some, Charlie.

DUKE Yeah, and they trend sorta up slope to the northwest or to the

YOUNG (garbled)

DUKE Got it.

YOUNG Got that.

DUKE Okay,

YOUNG Yeah.

CAPCOM Yeah, it's funny. It turns the same as Hadley.

DUKE Yeah, it does exactly. And it goes right up over the ridge, a ridge line and back down the ridge, the one with, the one that's got Cinco craters on it, and then back down into the ridge where

YOUNG Boy, Charlie, looks like we could just - Smoky and Stone Mountain looks like they're 10 feet away.

DUKE I know it. You'd just run right over there.

DUKE The thing wouldn't stay on a minute ago.

YOUNG Now, you can't get it off.

DUKE Maybe if I unlock, that might be the problem.

DUKE (garbled) around.

YOUNG Which way?

DUKE To your right. Other right. There you go.

No, your right. Okay, now bend over. Now Got the strap. Standby.

DUKE Still holding.

DUKE Okay, you got it.

YOUNG Okay.

DUKE Let's go.

YOUNG Good.

DUKE Okay, Tony, I hit him with 195, that hadn't changed.

CAPCOM Good show.

DUKE (garbled)

CAPCOM Okay, we'd like a full set of readouts here and we also would like to verify that you have the front drive on buck bay. Drive power.

DUKE Front drive is on buck bay and, I changed that back a while back.

CAPCOM Rog.

YOUNG Okay, we're going to mode switch one.

Will that mess you up on getting that front drive stuff?

CAPCOM No, that's okay.

YOUNG Houston, we're going to mode 1. Okay?

CAPCOM Okay.

DUKE Say, do you all want to be checked ---
PAO At this point the crew has switched off the television. They are prepared now to drive across to Flag Crater, the first stop on their geology traverse on this extravehicular activity. That crater is about 1.3 kilometers distant from the ALSEP site. It'll take them about 11 minutes to get there. And at the present time this EVA is progressing very smoothly. We have - we predicted that the ALSEP site based on the headings that the crew gave us from the lunar Rover is about 2 to 300 feet south, and perhaps a bit southwest of the landing site. We are now some 4 hours 3 minutes into this extravehicular activity. And following EVA 1 we expect to get a decision on the possibility of conducting a third period of extravehicular activity. Our situation with that with respect to that third EVA remains unchanged. We are doing the preliminary planning for 3 EVAs and at the end of this extravehicular activity, if the consumables continue to look good, we do have an excellent chance of being able to get all or part of that third EVA in. However, that decision has not been made at this point and will not be made until we have gotten a chance to see how the consumables, particularly the lunar module water supply, which is used in cooling, looks after the first EVA.

DUKE The forward and read motor temps are off scale low, amps are zero and the volts are 68. And we are on our way.

CAPCOM Out standing.

CAPCOM You now have the NAV, BEARING AND RANGE.

YOUNG Yeah, we do.

YOUNG Okay, 3, 33 0 33 at the bearing, the rage is .1.

CAPCOM Okay, we copy that.

YOUNG Hasn't changed any, huh?

DUKE Hasn't changed any.

DUKE Okay, Tony, looking off to the northwest there you can see South Ray Crater with just tremendous amount of blocks on it, with some black streaks, and here we go. Heading 274, John.

YOUNG Okay.

DUKE It's going to be a piece of cake taking pictures from here, Tony. It's a big crater. There's about a 10 meter off to your left there, John.

YOUNG I see it, but.

DUKE A deepy one over here. 4 clicks an hour
Tony and

YOUNG Charlie, you hit my arm.

DUKE Excuse me.

YOUNG I'll end up in that big crater. So mad.

DUKE Okay at 043 at 210 just beyond the ALSEP there are two twin craters, the biggest one is to the north,

DUKE It's got blocks in it, up to 6-50 centimeters and it's about 5 meters deep.

YOUNG Say again what your best guess is to this thing?

CAPCOM By adding up 274.

YOUNG 74 huh?

DUKE Now one thing I can't do is see the map.

CAPCOM Okay, I'm not sure that heading is good, that was based on an earlier estimate of where ALSEP was, and your bearing now may make that wrong.

CAPCOM Pretty much if you go west you are going to hit Spook.

YOUNG That's what we're doing, going west. I'm not sure we didn't - I'm not sure that's not it right there, Charlie.

DUKE Where.

YOUNG Right there. That couldn't be it, could it?

DUKE I don't see it. Man this is the only way to go, right in this Rover.

CAPCOM Right. Only way.

DUKE You can hear the motors going, Tony. Okay, we are still in this boulder field, on a heading of 300 now. Just navigating around a couple of craters and they are very angular. All of them look the same of these breccia glass with a dark matrix with a white glass. Biggest one I've seen is about over the 12:00 position of the Rover and we're 065.2 and it's about a meter across. Tony, we seem to be riding across a ridge top, the trend is east-west. Off to the left it drops off drastically, about maybe a 5 to 10 degree slope into a valley which is probably Hidden Valley.

CAPCOM Very good.

DUKE And white -- and north -- and South Ray Crater is spectacular in our 10:00 position and we're 072 at .3 now.

CAPCOM Do you have that speed in.

DUKE Huh?

YOUNG What did you say?

CAPCOM Do you have the speed and the amps.

DUKE Okay, you're 5 a--

YOUNG You got to go around this, Charlie.

DUKE Yeah, you're 5 kilometers an hour and the amps are oscillating about between 10 and 20.

CAPCOM Okay.

DUKE How's it driving, John, pretty easy?

YOUNG Darn good.

DUKE Hey, man, we could just go, Babe. I'm really cinched into this. Smooth --.

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 2:47 GET 123:04 460/4

YOUNG Yeah, but I don't know with these holes if
we ought to do that or not.

DUKE This seatbelt is great.

DUKE It seems to be taking it with no problem.

DUKE We are at 6 kilometers an hour now, Tony, 4
tenths, still nothing new to report. Maybe more cobbles in
this area now. In fact there are. The regolith is more cobbly
in appearance, but still ---

END OF TAPE

DUKE We're at 6 kilometers an hour now, Tony, 4/10. Still nothing new to report. Maybe more cobbles in this area now, in fact there are. The regolith is more cobbly in appearance, still angular. Maybe 40% of the surface is covered with cobbles that are 10 centimeters.

YOUNG (garble)

DUKE Look at that one.

CAPCOM And right on time line.

DUKE We see some (garble) fresh craters. Okay, meter size, that show some very fresh at least, perhaps it's indurated regolith, that's what it looks like, because it's a little hard clods are the same inside the craters as on the rim.

CAPCOM Okay.

DUKE At our 11:00 position we're at 089 per point 4, we have 2 very bright, small craters that are 3 meters across and we see some whitish materials down below in the walls of the craters there. There about 25 meters off.

CAPCOM Okay, Charlie, those rocks that you collected were they all breccias are could you tell?

YOUNG We never did get one.

DUKE I'm not sure, Tony, I think they were breccias but they were sort of really dust covered and so I couldn't tell you, really.

CAPCOM Okay, I understand. And have you seen any rocks that are -- you're certain aren't breccias?

YOUNG Quit hitting my arm.

DUKE Negative, I haven't seen any that I'm convinced is not a breccia.

CAPCOM Okay.

DUKE Okay, we're going generally west now, and at our 1:00 position on a heading of 270 at a bearing of we're 09 and .5 we're in another distinct ray field, ray lets say boulder field. We sort of passed out of one and we're in another one. And it's we're getting these go ahead, John.

YOUNG Think that to the south of us is Spook?

DUKE It could be.

CAPCOM Roger, you should be just about --

DUKE No Spook's about lets see -- in 6/10 we should be at Spook, huh? Spook is at 100 and 9/10, not there yet. We're only 6/10, Tony. Okay, this ray field has the same pebbles and cobbles and some good secondaries here.

CAPCOM Right, (garble)--

DUKE John's just doing great driving --

CAPCOM Is the point by Buster, you should be coming up to the edge of Spook, the eastern edge of it.

DUKE Okay, turn left, John, and lets go look at that -- down over there. Boy, Tony, there is some excellent little secondaries with the indurated regolith in them and on the rim. The biggest one is a couple of meters.

CAPCOM Very good.
DUKE You know that might have been Spook right back there. That was a pretty big crater.
YOUNG It sure was.
DUKE Right back there, John. Boy it's really hard -- there's an interesting rock. A layer -- layered, really dust covered, like a regolith, I mean a -- turn left, John. There's a crater over there, a big one.
YOUNG Boy that is a biggie.
DUKE That's it. That's got to be -- and here Busters right over here, with some blocks around it, to my right.
CAPCOM Outstanding.
DUKE Boy that is a biggie. Okay here is Spook and at 089 at point 7. And that is a biggie. (laughter)
YOUNG We're looking we're almost completely past it we're not right even with it. Where'd you say Buster is?
DUKE I thought it was right over here, John.
CAPCOM Is the rim as smooth.
DUKE No right straight ahead here.
DUKE Negative, it's real subdued, Tony.
CAPCOM Okay, do you see any ledges or anything inside the Spook?
DUKE No, we sure didn't. We're driving on, now. I think we're coming up on the rim of Buster and we've got some a real good boulder field around Buster.
CAPCOM Okay, good show.
DUKE With some frags that we'll be able to get off. The biggest boulder is a meter, cobbles is real good for raking here, here it is John, you see it Buster, there it is. Okay, in Buster, Tony, I can see some huge boulders in the bottom of that thing. Man John,
YOUNG That is a big crater.
DUKE How big is Buster, Tony?
YOUNG 40 meters.
CAPCOM About 40 meters.
YOUNG That's bigger than Buster. That's Buster, 50 meters, it's a 150 feet, Charlie.
DUKE Okay, that's Buster, then.
YOUNG Yep, sure is.
DUKE And, Tony, we've got some five meter boulders in the bottom of it. Some real big ones. The biggest, 5 meters and the whole bottom is covered, we're going down slope now.
CAPCOM Okay, there should be a scarp around there someplace.
DUKE That's going to be great, Tony, we'll be at -- okay we see it. Over to the our 2:00 position and it's look like the rim of a crater but I think it's a scarp.
YOUNG What's the heading from here to -- oh man
DUKE Okay, we want to head just keep going west.

YOUNG 26 something, Charlie.
DUKE We want to get a 100 degrees at about point that's station 2, wait a minute, we want 96 at 1.5, it's about 280. I'm about to freeze. I have to turn my water down. Okay Tony, most of the rocks that we've seen look breccias to me. We're making good time at about 7 kilometers an hour. Off to the right what I thought was a scarp was turned out to be a crater on the side of a ridge that runs east west.
YOUNG Driving downsun in 0 phase is murder.
DUKE It is, isn't it.
YOUNG it's really bad.
DUKE We're out to 089 at 1.0, Tony.
CAPCOM Okay.
DUKE Making great time though. Okay in this area the regolith is real smooth the block -- cobble population is distinctly smaller and we're eek. I hope that's Spook, how big is Spook, 300 meters, there it is there's the Buster, I mean there's Flag. We're here, you did it.
YOUNG (laughter) it sure is isn't it?
DUKE We are here.
CAPCOM Wow, congratulations.
DUKE Okay, 088 at 1.0 is -- Hey, we stopped John about 40 meters from Plum.
YOUNG Hey, man, I don't see Plum
DUKE There it is right there.
YOUNG That's Plum?
DUKE Yeah.
YOUNG I ain't even on the rim.
DUKE Well it is, yeah it is, the rim is right here we're on top of the rim.
YOUNG Okay.
DUKE Hey, stop we're just going to be terrible walking on this thing. Why don't we turn around and go back up on the rim where it's level?
YOUNG Suits me.
DUKE This is steep slope here. Okay, Tony, there didn't seem like there was that much distance between
YOUNG 300 meters since Flag.
DUKE That's not 300 meters, is that 300 meters right there?
YOUNG Charlie, you got me I can't tell.
CAPCOM Okay, could we have another range and bearing, please?
YOUNG Okay, 087 at 1.1.
DUKE Well that's a big crater anyway.
YOUNG Yeah, it looks to me like we're due north of South Ray crater right now. I can look down there and I feel like I'm bisecting it. No we're not due north of it, not according to shadow.
DUKE Get the map out.

END OF TAPE

YOUNG Get the map out here. Let's get off and start working.

DUKE Okay, it was 9/10 to 6/10 between Buster and - that's got to be Buster.

YOUNG Right there, hun? That is a forty meter crater.

DUKE Over here?

YOUNG Yes.

DUKE Yes, that's what I'm thinking.

YOUNG It'll do, wasting more time thinking about it.

DUKE Okay, let's do it. Okay, Tony we're going to call this, Flag.

YOUNG He parked the thing heading south. You want to get off?

DUKE No, go ahead.

CAPCOM Okay. And ...

DUKE It has all the characteristics - we must have landed ...

YOUNG Not (garble) here.

DUKE When your brushing off the crew there, would you get the TV lens, please.

YOUNG You bet.

DUKE I tell you when you get on this thing you better turn your cooling down or you'll freeze.

YOUNG Yes, should have gone to min cool, forgot all about it.

DUKE Me too.

YOUNG Okay.

DUKE Okay, Tony what we've got here is - we think we're Plum crater is sitting right on the rim on the outer rim of Flag and it's what appears to me to be 200 meters - pretty big crater we call Flag and it's in an identical spot for ...

YOUNG Another big one right back there (garble).

DUKE See that big one back up there that we called - this might be Halfway, this one right here.

CAPCOM Alright tired ...

YOUNG This one here?

DUKE Yes, this one right here.

CAPCOM Our measurements say that you should be pretty near Halfway.

YOUNG Okay, why don't we get back and try some more Charlie.

DUKE Okay, I agree.

YOUNG I did it again.

DUKE What.

YOUNG Pulled out the thing. Get that for me, Charlie.

DUKE Yes.
YOUNG I know what it is everytime I put
the belt on it pulls - tighten down the belt it pulls my ...
DUKE Can you push against me. Just stand up.
Let me get down slope and you get up slope.
YOUNG Okay, be careful.
DUKE Your moving away from me can you prevent
that?
YOUNG Okay, it's back in.
DUKE Man, it all looks the same doesn't it?
YOUNG Sure does.
DUKE Okay, Tony based on your knowledge of
our position give us where you think Flag is.
CAPCOM Okay, it looks like Plum crater would be
almost due west of you about 200 meters.
DUKE Okay, I'm hooked, John. Roger.
YOUNG Hold on, it twisted a little bit. Turn
it clockwise, counterclockwise the other way.
CAPCOM I'd loop around halfway to the south.
YOUNG I've got it. That's what we're doing.
DUKE I think that's what we're doing. We got
a little depth size problem here and I think we'll figure it
out here in a little bit.
CAPCOM Very good, understand.
DUKE And this crater here is probably South -
correction Halfway with a smaller one on the side.
CAPCOM Rog.
YOUNG I tell you that is a bigger crater than
that, though.
YOUNG Okay.
DUKE You in?
YOUNG Excuse me, Charlie.
DUKE Okay, we're on the way again, Tony.
CAPCOM Okay.
DUKE Can you go to the right, John, there's
a pretty fresh patch dead ahead.
DUKE That's about a tenth of a kilometer across
there, that's a big crater right there.
YOUNG I don't think it's a 300 meter.
DUKE I feel real faith in this thing, open her
up a little bit.
YOUNG I can't see where I'm going Charlie. Here
we go.
DUKE Okay, Tony we left that Halfway and we're
now enroute to - Halfway and Buster looked about the same size
is that right according to ya'lls calculations?
CAPCOM That's right Charlie.
DUKE Okay, well that's what that was Halfway.
CAPCOM Okay.
DUKE It takes those little bumps - oh it won't

DUKE take that one, but it'll take those little ones just great.

DUKE Okay, Tony we're at 086 1.2. We're coming into another block ray field up ahead of us about 50 meters or so with angular blocks. The area we have here now is almost cobble free, except perhaps less than one percent of the surface.

YOUNG Yes, it's clearing up.

DUKE And now we're - there's another ray we're coming in out of South Ray which definitely out of South where you can see it trending right on in to South Ray.

CAPCOM Outstanding.

YOUNG Yes, this is South Ray - that's that big South Ray crater, ray down here, I think.

CAPCOM Right..

DUKE You can see Hidden Valley. You can see partially into Stubby. The Cinco crater is very visible up there on the side.

CAPCOM Is there any albedo difference when your in a Ray or just the cobbles and boulders?

YOUNG No, it's albedo.

DUKE There is no mistake in your mind when your in a Ray because of a block.

CAPCOM Okay.

DUKE And the surface is a little bit lighter - the regolith. The rocks are very angular.

YOUNG I'd like to tack. I can see a lot better. Just a little north or a little south.

CAPCOM Do you see both the white and the black and white, here.

DUKE It's mostly gray, Tony, with a - there's a big crater over there John.

YOUNG That's it.

DUKE Okay, that's it. We're coming into the south of Plum. Okay, this is probably Plum right over here - no I guess not. Plum's 40 meters that's not nearly 40 meters.

DUKE Okay, Tony I think we finally found Spook, here or Flag rather.

CAPCOM Okay, did you notice that scarps that's mapped that you should have driven across?

DUKE No, didn't see it. It's all hilly and scarpy, here (laughter).

CAPCOM Okay, do you notice a trend to the scarps they all seem to be northeast.

END OF TAPE

CAPCOM -- scarps they all seem to be north east.
DUKE Yeah, that's probably pretty close. Northeast.
DUKE Okay, here -- that's got to be it, John.
But I don't see Plum. Unless this is it right here.
YOUNG This is it, Charlie.
DUKE We are on the rim of it. Okay we got to park
on the other side about 40 meters up, do a 180 left. Well, Tony,
we finally found it at 087 and 1.4.
CAPCOM Good show, that's where it should be.
PAO 087 is the heading back to the lunar module.
1.4 is the mileage back to the lunar module.
YOUNG Man you can't believe this territory.
DUKE All up and down, we're going to be a little
closer, John, but that's okay.
YOUNG Okay, because the --
PAO And a correction on that last one, 1.4 is
the kilometers back to the lunar module.
DUKE (Garble) Plum.
DUKE Dismounting. Okay readings are 180 088
2.0 1.4 115 115 115 AMPS are 0, volts are 70 68 68, 100 100, rear
motors all scale low, forward motors all scale low.
CAPCOM Okay, we copy. You should be about 40
meters from Plum, is that right?
DUKE No, we're not, we're right on the rim, if
that's okay with you.
CAPCOM That's okay.
YOUNG You will be able to see everything we do.
CAPCOM Okay.
DUKE Thank you. For some reason I'm not bouncing
out of this thing like I thought I would.
CAPCOM Are you still in the ray material there
at Plum?
DUKE No.
CAPCOM Good. We don't want to be.
DUKE The ray material is just -- the ray
material is about 50 meters to the east of us, Tony.
CAPCOM Outstanding.
DUKE Okay, we saw the boulders at Buster, we
saw the Northeast -- we didn't see the northeast star, okay
I got the displays I'm going to get the pan up on the rim
of Flag crater. Yeow is that some crater, Tony. Whew, it's
a smooth crater, very subdued, but's it's really steep and
there's some smaller craters 10 meters or so on the side .
PAO We should be getting the T. V. up
before long at this site. One of the things the crew hopes
to sample at Flag crater, is the local Cayley formation.
The reason that they're interested in avoiding the ray material
is that it most likely comes from South Ray crater and would
not represent the local Cayley formation.

DUKE Tony, the sides are steep enough to cast a shadow of from the sun, so you can estimate from what our sun angle is what the wall of that are.

YOUNG Hey, is it okay, if I turn you around to dust the snow out of yours eyes there?

CAPCOM Okay.

YOUNG Okay.

DUKE Okay, Tony, to the north side of Spook, right on the --- I keep calling it Spook -- on Flag there's a crater right on the inner rim, that has a blocks in it that are not too big, cobble size I'd say.

YOUNG That help any, Houston?

CAPCOM We don't have picture yet.

DUKE And ah --

CAPCOM We don't have picture yet.

DUKE Both ridges (garbled)

PAO While we're waiting for the television to come through and the communications to clear up we would like to pass along that all is well with Ken Mattingly, in Casper. We'll be reacquiring Casper shortly there. That spacecraft is now behind the Moon, coming up on its 26th revolution.

DUKE It's crazy (garble) Tony, the sides of this thing get pretty steep. I'm not going to get down to far, I can't see the bottom of it. And it's getting so steep I don't want to go any farther. Okay --

CAPCOM Sounds like a good idea, Charlie.

DUKE On the southwest flank of Plum, on the southwest flank of Plum we have a buried boulder and it's about a meter across and that's the only boulder we see of any consequence here at Plum. In Spook -- in a Flag, on the southwest rim about half way down into the crater we see a block that's sticking out, tht's very angular, that's maybe 2 meters across and it's in an area of whiter albedo. It's probably a buried block, I wouldn't call it bedrock. I see nothing that looks like bedrock.

CAPCOM Okay, how far down from the rim are you?

DUKE Hey, John, (garble) Half way.

CAPCOM Okay.

DUKE A rake soil coming up.

YOUNG Okay.

DUKE And that's doing it up on Flag. I can do some sampling and radial along Flag, -- oh there's a great place for the rake, see right up there?

YOUNG Yeah, we don't even --

DUKE 12:00, Yeah, I got the rake that's all I need, I can shovel

YOUNG Okay let's go.

DUKE Aso, here we go! Hey, we're going up to where it's more cobbly, Tony, to get the rake sample, pretty smooth right here.

CAPCOM Okay, the rake sample should be 1 crater diameter away, from Plum, and it doesn't have to be
YOUNG Plum?
CAPCOM Right, and it doesn't have to be too, cobbly there.
DUKE Okay, okay, well this is about it then, John.
YOUNG Yeah, but I don't think any of - the rocks from may have come from Plum, but they maybe some other place too.
DUKE Well let's do what they want us to do.
YOUNG Alright.
CAPCOM Right, the intent was to get other things than Plum right there --
YOUNG How about right out there, in my shadow?
There's some right there that might be --
YOUNG I'm sure going to get them.
DUKE Okay, downsun 11, footer --
YOUNG Right here, Charlie?
DUKE Yeah, that's fine.
CAPCOM And, John, if you get a chance could we get a frame count from you?
DUKE Hey, Tony, I'm at 50 magazine Bravo.
CAPCOM Okay.
YOUNG Okay, I'm at 10, magazine Bravo. Charlie, you're standing in the shadow.
DUKE Sorry, I'm moving. Man it's so easy to get around up here.
YOUNG Okay, lets do it.
DUKE There's the locator and we'll start the old rake, for the first time. Get that beauty. Right there. Look at it come through that regolith, would you?
CAPCOM Charlie, Houston, we'd like for you to check your primary water valve.
DUKE Go ahead.
CAPCOM Make sure it's open.
DUKE Okay, I'll let, John, check it. I'm feeling good. Nice and cool. Can you check it?
YOUNG Yeah. Wait a minute. I'm not sure it was all the way open. Yeah, it's open, Charlie, it's all the way open.
CAPCOM Okay, we copy that.
YOUNG Houston, it's open all the way.
DUKE Yeah, I feel good cooling, Tony. Move that and let's get around out of the way there. Another rake. Okay, Tony, we got about -
CAPCOM Okay, Charlie, we think you're about to run out of primary feed water, stand by for the tone - just press on there.
DUKE Okay, all ready? Is that right?
CAPCOM That's affirmative.

DUKE
expecting it.

YOUNG
CAPCOM

DUKE
YOUNG

DUKE
YOUNG

Go to min cooling. Okay, ya'll been

All the way up is min, isn't it, Houston?
Yeah.

Wait a minute I'm losing all the rolls.
Yeah.

There's 3 little ones. Two little ones now.
Better get another one.

END OF TAPE

YOUNG There is a pretty good.
DUKE Sure does, there's a glassy one right there.
I can't tell what the other ones are.
YOUNG Me either. All dust coated. Do you want
me to go low or high or what?
DUKE No, that's fine.
YOUNG Okay.
DUKE Okay, Tony, we got about a half a sack full
Going in bag
YOUNG 373.
DUKE 372.
YOUNG 372.
DUKE 372 with 3 rakes. Over.
CAPCOM Okay, we copy that. 372.
DUKE And there were lots of smaller ones, but they
got - more smaller ones but they fell through the tines.
CAPCOM Okay, we copy.
CAPCOM I take it the soil isn't too cohesive here.
YOUNG Well, we only hold the bag for a second.
DUKE No, they're just small.
CAPCOM Rog.
DUKE If we'd picked another place - can't get
the top off.
YOUNG That's right.
DUKE Did you get it?
YOUNG Yeah, I got it.
DUKE Okay.
DUKE Okay, John, if you step aside, I'll get a
soil sample. Okay, there's the tone Tony.
CAPCOM Okay.
YOUNG want me to get your aux water on?
YOUNG Want me to get it, Charlie?
DUKE Aux, I got it. Aux water is on.
CAPCOM Okay.
DUKE Hey, how much soil, Tony?
YOUNG Kilo.
DUKE Kilo, huh. That's what I thought.
CAPCOM That's right. One kilo.
DUKE That's about a kilo. One more scoop full?
YOUNG Yeah. A little one.
DUKE Okay.
DUKE Rock.
YOUNG Almost looks like black soil.
DUKE Okay. Man, it's really soft here Tony on the
rim. You don't sink far, but when you walk on it, it gets
very ---
YOUNG That's the last time I do that with soil.
DUKE When you rake it - Did it come out? Did
you see anything? Look at that gnomon already, would you?

DUKE Look at the color chart?
 YOUNG Dropped I got dirt all over it. We'll just
 have to be more careful.
 DUKE Okay, this is 354. Going in bag 354, Houston.
 CAPCOM Okay, 354.
 DUKE Hey, Tony, is the feed water pressure coming
 back up again?
 CAPCOM That's affirmative.
 DUKE Okay, I don't feel it. We ought to start
 from here, John, and do a radial sampling in towards Plum.
 YOUNG Okay.
 DUKE Okay, why don't you go ahead and get started
 and I go get the shovel. Okay?
 YOUNG Okay.
 DUKE Tony, I went to minimum on my coolant.
 CAPCOM Okay, we copy that.
 DUKE Hey, was that about what time you expected
 or was I, am I using it faster than normal?
 CAPCOM Ah, you're using it just a hair faster.
 We'll probably take a couple minutes off the EVA, but it's
 nothing real bad.
 DUKE Okay, I feel like what happened is that, I've
 been on a little bit more than minimum cooling. About pushed the
 Rover over.
 YOUNG Well -
 CAPCOM Charlie, Houston, we don't want you to stay
 in min cooling, if you need more cooling than that, you don't
 really buy anything, you just store it and have to pay it off later.
 DUKE Understand. Understand. I was just telling
 you what the circumstances were.
 CAPCOM Okay.
 DUKE Thank you for the reminder.
 DUKE What are you picking up? That little old
 thing?
 YOUNG Charlie, that's as good as any of them.
 DUKE (laughter) It looks like it is going to come
 apart though to me.
 YOUNG Never mind. There's 3 or 4 samples right there
 we can get.
 DUKE I'm just trying to turn my feed water on a
 little bit. I'll get these in the shovel.
 YOUNG Okay.
 DUKE If you don't get out of that - If you don't
 get that thing in the --
 CAPCOM Okay, are all of these rocks looking pretty
 much the same?
 DUKE They are all covered, Tony.
 YOUNG All got covers.

CAPCOM Okay.
DUKE Dust.
YOUNG What do you mean, Charlie.
DUKE Bag.
YOUNG Okay.
DUKE One.
YOUNG They're angular.
DUKE All angular though, I'll tell you that.
DUKE Here's one with a white streak, looks like
a koliche streak through it. Leave it. That's all and it is
a white rock.
DUKE You have 4 samples John. Is that
good enough?
YOUNG Yeah, that's in bag 371, Houston.
CAPCOM Okay, 371.
DUKE Get the locator.
DUKE Hey, wait a minute, we need the soil from
there.
YOUNG Okay.
YOUNG Put this in your bag.
DUKE Okay, come on over.
DUKE Man, that crater. That is really something.
Tony, on the west side of Flag there is a small crater maybe
2 to 3 meters across, it's real fresh, has some real bright rays
and you can see a blocky interior. Wait a minute, John, just
let me shoot. There you go.
CAPCOM Wecopy that, Charlie?
DUKE Okay. And that's about a third of the way down
from the rim. Wish we could see the bottom.
YOUNG That's going in bag 363, Houston. 363.
CAPCOM Okay, 363.
YOUNG Let me get after that, Charlie.
DUKE Okay, I'll move.
YOUNG I'll have to get it from the other side.
YOUNG Okay.
DUKE Okay. Here's one right here, John, that
will make a good one. See that one right there by that foot
print. That's a good sample size. About 5 centimeters across?
YOUNG That one --
DUKE No, that one right here to the right of my
shadow. See right there. Let me show you. Okay.
YOUNG Right there.
DUKE Right here. See.
YOUNG Okay.
DUKE Okay. It's an angular subangular rock, Houston,
5 centimeters. I can see some white clasp shining through it.

YOUNG Bet it's dust covered again.
DUKE It's all everything here is dust covered.
DUKE Got that beauty.
YOUNG That's enough.
YOUNG Okay, Charlie.
DUKE Okay, Tony, it's a white matrix, it's a breccia looks like, white clasp with some greenish looking very small millimeter sized phenocryst in a black matrix.
CAPCOM Okay, we copy that.
YOUNG Goes in bag 364, Houston.
CAPCOM Okay, 364.
YOUNG Okay. Ah. Let me get that soil sample.
DUKE Yeah, wait a minute. Let me get out -
bounce out of the way here.
DUKE Oh, John, fell out.
YOUNG You're bouncing to high.
DUKE No. Did you close--
YOUNG I'll get it.
YOUNG No. I didn't close the top.
DUKE Oh.
YOUNG And I didn't stuff it down in there.
DUKE Got -- about fell down.

END OF TAPE

YOUNG I'll get it.
 DUKE Did you close it?
 YOUNG No, I didn't close the top.
 DUKE Oh.
 YOUNG And I didn't stuff it down in there.
 DUKE That's how I fell down. I got you. Got
 it. Two man job.
 DUKE Tony, it's really spongy here, the rego-
 lith is real loose and noncompacted if that's a - unconsila-
 dated is the word I'm searching for.
 CAPCOM Alright, we copy. Can you see where the
 TV is pointed?
 DUKE Yes, it's pointed down towards South Ray.
 CAPCOM Right, over to the right on the edge of Plum
 there looks like there might be rock with some sereincres in it.
 If your over that way you might look around and see if you
 see someting like that. It may have just been dust on it.
 DUKE Okay, there's a big rock on - that I've
 already discribed. You get the (garble) John.
 YOUNG Yes, I've got the AF B 1. Let's this
 go a second.
 DUKE Okay, coming up.
 DUKE Bags are a pain, aren't they? Okay.
 YOUNG Let's go to back 356, Houston, soil sample.
 CAPCOM Okay, 356.
 YOUNG And after this.
 DUKE Okay.
 YOUNG Okay, Houston, I'm on frame count now 24.
 DUKE Hey, there's one right on the rim we can
 get.
 YOUNG Okay.
 DUKE There's a good size one right over here
 by my foot print. Actually I took pan 1 where pan 2 should
 have been. Okay, looking down into Plum, Tony, there is some
 cobbles and things on the inner rim, but they aren't very
 large maybe 30 centimeters or so the biggest.
 YOUNG Want to get some of these here, Charlie.
 That definitely the breccia right there, John.
 YOUNG Yes, see the glass in it.
 DUKE Yes.
 YOUNG I forgot - I even forgot to ask locator
 cn that last - no wait a mintue I think ...
 DUKE That's the way that thing that color
 chart is so covered with dust it won't matter anyway.
 YOUNG I know - I'll clean it off. Go out and
 get this one. How we doing on time, Tony.
 CAPCOM Okay, you've got about 23 mintues left,
 here.
 DUKE 23.

CAPCOM Rog.

DUKE We can pick up a lot of rocks in 20 - Hey I'd like to go to the other side, John, of Plum because those rocks over there aren't dust covered if you can see them.

YOUNG That's a good idea, Charlie.

DUKE See right out there towards South Ray.

YOUNG Yes.

DUKE Those rocks don't look at dust covered as these. Uh oh, I missed wait a minute.

CAPCOM Nice juggling.

DUKE Well, it wasn't dust covered. Now we missed it, but things really fly up here I'm amazed.

CAPCOM You guys sure have dirty hands.

YOUNG My first guess is it is a breccia with white glass in it. And I see lineations all along it in the breccia. It's a white glass breccia is what it is. I see no other glass in it. Of course, once you get the dirt off of it might all be white. At first cut would be a white glass breccia. Going into 362.

DUKE This one is at the same spot is a breccia with a white matrix is glass coated on one side and then typical glass lunar surface glass coating.

CAPCOM Okay, we copy that and when your through with this site you can press on around Plum if you like.

DUKE Okay, we'd like to. There is a big boulder over there and there are some blocks that aren't - that are sitting out and aren't filleted. We'd like to try over there. See what ...

CAPCOM Okay, use your descretion, your've got the time.

DUKE Hay, John why don't you grab that line, that crummy thing.

YOUNG Okay, those are big glass aren't they.

DUKE Yes. See that glass right there on the top.

YOUNG Yes.

DUKE Okay, Tony the general terrain here is sloping off to the south - correction yes southwest at about 1 to 2 degrees and the Plum, excuse me, Flag crater is on this - it's about to the top of this big ridge that slopes off generally to the southwest to the west of South Ray, over.

CAPCOM Okay, some of the boulders you see around there do they have fillets and if so are they doped up on any particular side.

YOUNG That rock bag is 352, Houston.

CAPCOM Okay, 352.

YOUNG I take it back, that's rock bag number 2.

CAPCOM Okay, number 2.

DUKE Come on stick around let's go.

YOUNG Okay.

DUKE Man, is it dark in those shadows. Want
to get an after there John I'll get - get it.

YOUNG Yes.

DUKE Okay, soil sample coming up. (garble)

YOUNG Okay.

DUKE There you go.

YOUNG Okay, that soil samples in bag 369, Houston.

CAPCOM Okay, 369.

DUKE 369.

CAPCOM Rog.

YOUNG Charlie, your going to fall down here with
all these rocks.

DUKE (Laughter) No, I'll give you the shovel
in just a minute when I fill up and we'll swap.

YOUNG Okay.

DUKE This shovel is a great tool, I'll tell you.

YOUNG Dad gum.

DUKE Ah, boy. Well, here comes the Bobsie Twins.

CAPCOM You guys look like your having a ball.

YOUNG We are it really is fun.

DUKE Now John, look at that foot print. Look
underneath that regolith when you kicked that up a centimeter
or so under it is white absolutely white right here.

YOUNG Well, take your old thing and do an
exploratory there for awhile. Let's suggest that.

DUKE Look - look at that come over here.

YOUNG Yes.

DUKE Look at that.

CAPCOM How about doing a skim right here.

DUKE Won't you look here. Okay, the top -

CAPCOM Okay, I guess we'd just like a scoop here
and no skim.

YOUNG Charlie's right everywhere -

DUKE Okay, Tony let me describe what it is.
The top centimeter of the regolith is gray and you get down
under that and it's white.

CAPCOM Roger, we copy that.

DUKE Different albedo - three shades different.

YOUNG You ought to be able to see that in the
TV right there, Houston.

CAPCOM Right, we can.

DUKE I'll dig you a little trench here. Boy
that's going to be a hard job, John. Can you see that Houston.
We'll sample right there and get you a scoop full of this
underlying regolith.

CAPCOM Okay, I guess -

DUKE It's a different albedo, it's amazing.

CAPCOM Charlie, we can see that here why don't
you go ahead and get a bag of the dark and a bag of the light

CAPCOM and then we'll press onto that block
from the Northwest side.

DUKE Alright.

CAPCOM Boy, my kids don't get as dirty as you are.

DUKE (Laughter) we're having - I bet they don't
have as much fun either.

CAPCOM I bet your right.

YOUNG Sure is neat here. Okay, let me get a
shovel full of this right off the top here. There we go ...

END OF TAPE

DUKE Well, I'll bet they aren't having as much fun either.

CAPCOM I bet your right.

YOUNG It sure is neat here. Okay, let me get a shovel full of this, right off the top here. There we go.

DUKE Now look at that finger, picked that up with 1 finger.

CAPCOM Ah, the delicate touch.

DUKE John, we're going to have to change that bag dispenser that is terrible.

YOUNG Is there another one? Do we have another one?

DUKE Yeah, we have another one under my seat.

DUKE Okay.

YOUNG That top scoop is going in bag 352, Houston

CAPCOM Okay, 352.

DUKE Ya'll know how good that -- water stuff taste. Ah! Try to get way down there, John and get a -- Uh oh.

YOUNG Uh oh, what?

DUKE I just uh -- had a good scoop full and I lost it. Let me dig out another little trench. There. There she be, coming up all white. That's all there's in there, John.

YOUNG Okay. And it's going into bag 357.

CAPCOM Okay, 357. You fellows are really packing them away there.

DUKE Okay.

YOUNG How do you feel, Charlie?

DUKE Fine, great. Tony, I can't get a locator you know we're right on the rim of --

CAPCOM We've located it on T.V., so we have it.

DUKE Alright. Okay, we're going over to the big boulder.

CAPCOM Good show.

DUKE Man you can't see anything downsun -- down phase John.

DUKE Tony, looking --

YOUNG That's what I was trying to tell.

DUKE Looking downsun here, down phase at this area down slope you get a definite feeling of lineations that run southwest, northeast, from Stone Mountain. There sort of little furrowed ridges and pits and things.

CAPCOM Okay, you don't see any sharp scarps or anything like that, though?

DUKE No sir, no, nothing like on that map.

CAPCOM Alright.

YOUNG It's worse.

YOUNG Boy I'll tell you there's holes that especially in zero phase.

YOUNG Now I'm out of water, drinking water that is. Okay.

DUKE Hey, John, you want to try just a piece of that?

YOUNG Look at that, Charlie.

DUKE What's that?

YOUNG This thing has greenish black clasp in it. Right there in that boulder, there?

DUKE Look like it to me too, yeah, let's see if we can get a piece of that. Okay, Tony, this is a sub rounded rock, boulder that's a meter to a meter and 1/2 across, it has a predominant fracture set of 20 centimeters on the side that run here, southeast, correction southwest northeast. Is the predominant fracture set.

CAPCOM Okay.

DUKE And it's partially burried.

YOUNG Look out.

DUKE Okay, and, John, over here also as we move around that very white material is right under the, right under John's, feet, I'll take a picture of that and he's really changed the albedo by kicking into this little crater by this big rock. Going to get all --- Ah, here he comes folks -- he's got the hammer out, I knew he couldn't resist

YOUNG Hehehehe

DUKE (laughter)

YOUNG I don't know if this will work or not Charlie. Well it couldn't pick a better spot. Here we go.

DUKE Going to do it. There's a piece. Let me hold you down a little bit. Hot dog, he did it. It's a very fliable rock, apparently, Houston.

CAPCOM Okay, outstanding.

YOUNG Charlie, don't do that, let me do it.

DUKE I got it. Leaning on the shovel. Okay Houston it's got some green clast, some white clast, a grayish matrix, the clast are millimeter size and make up a 5% of the rock. One big crystal is 5 milimeters across, but I can't tell what it is. But it's a beauty.

CAPCOM Okay, you think there're still breccia?

DUKE I'm not sure, John, I think it might be-- yeah I think it's a breccia, really, very fliable.

YOUNG Yeah, it has -- it's a breccia, Houston.

DUKE Yeah, uh huh.

YOUNG Well, ah, no that's not right. It's a breccia and I can see at least, like Charlie, said there are 2 or 3 different type clast in it. It's just a 1 stage breccia though it looks like. It's going into bag 353.

CAPCOM Okay, 353, and you said about --

DUKE (garble)

CAPCOM about 9 minutes until you have to leave.

DUKE Alright, we'd like to go out and get one of those sharp rocks and a soil sample here.

CAPCOM Okay, sounds good and while you're taking pictures there can you take some pictures of the lineations on the ground you talked about?

DUKE Yeah, I'll do that when I get to the right spot.

CAPCOM Okay.

DUKE Okay, I'm taking a soil sample of the fillet around this rock.

CAPCOM Okay.

DUKE Boulder. John, you just whacked that beauty right off of there.

YOUNG Like you say it's fliable (laughter). I hit it on a fracture set too.

DUKE Yeah. Turn the shovel that way.

YOUNG 368 this stuff is going into, Houston.

CAPCOM Okay, 368, the soil.

DUKE Okay, I'll get the after on that, John.

YOUNG Okay. Charlie's, getting the after on that soil in 368.

CAPCOM If you have time can we do a second pan from here?

YOUNG Yeah, I'm supposed to do that, ain't I?

DUKE Yeah, I was just thinking about that, that'd be a good idea. We're right on the rim of -- we're really right on the rim there's rocks right on the rim of -- on the rim of both Plum and Flag.

YOUNG My guess is that the rock is the way it's laid in here it probably from the bottom of Plum, somewhere, or down there somewhere.

DUKE Okay, John, I'm going to go over here and get some of these lineations.

YOUNG Okay.

DUKE Close up. Get some of them out there for scale. Tony, the lineations might be -- might be just -- I think really what it is the shadows cast by the sun, because the regolith is so unconsolidated -- losely packed.

CAPCOM Rog. I think you're probably right, but it makes a good study.

DUKE In fact I'm convinced of that. And okay that's 2 stero from 7C --

END OF TAPE

DUKE In fact I'm convinced of that. And that's
2 stereo from 7B.

CAPCOM Okay.

DUKE John, you are just beautiful. That is
the most beautiful sight.

YOUNG What's that?

DUKE You standing there on the rim of that
crater.

CAPCOM Dog gone, I've never heard John, described
as beautiful.

DUKE No. Well, he's not - actually he is on
this thing, I'll tell you.

DUKE Hey, John, I'm going to run on out and look
at some of these angular ones out here.

YOUNG Okay.

DUKE Tony, those lineations are definitely due
to the shadows on this loose regolith.

CAPCOM Okay. We're going to have to hustle you
on pretty soon, so you better grab those angular rocks.

DUKE Okay.

YOUNG That pan takes me through frame 53.

CAPCOM Okay, 53.

DUKE Tony, I'll document this one while John
get coming over with the scoop. In place is a gnomon.

CAPCOM Okay, fine.

CAPCOM Boy, this TV sure makes it fun.

YOUNG And we real - -

YOUNG Really make good time around here.

DUKE Yeah.

YOUNG Did you get that biggy, Charlie?

DUKE That one right there, is what I want to
get. Think it will go in the bag.

YOUNG No.

DUKE Try it. This is a great way to do it
leaning on this shovel. It might go in the bag, John.

YOUNG Bag, Charlie.

DUKE Huh?

YOUNG Let's not even trying.

DUKE Don't want to try?

DUKE Okay, this angular rock is too big for a
bag and it's got some glass on it and I think it's breccia
also, Tony. It's going in John's SRC.

CAPCOM Okay, and it's time to go back and pack up.

DUKE Okay.

DUKE Gosh! I see what you mean.

YOUNG Yeah, ya can't get the top off.

DUKE Get the top off? Now just pull it off with
your things.

DUKE Okay, I figured I was going to do that.
YOUNG Can't believe that terrain, Houston.
DUKE Here you go, John. Why don't you carry it
back.
CAPCOM You're right. That's pretty spectacular.
YOUNG Let's just lay it --. I'll just lay it
in the seat.
DUKE Here we come.
CAPCOM Okay, we see you.
DUKE Ready or not.
CAPCOM We're ready.
YOUNG Get my hammer, Charlie.
DUKE Boy! How did that come out?
YOUNG I don't know.
DUKE I'll get it, John.
DUKE I can do it with a shovel easy.
DUKE I'm glad you saw that.
DUKE Have you got everything?
YOUNG Yeah.
DUKE Give me something. I can carry something.
Hey, it's in there. It's not in your pocket. There it goes.
DUKE Time flies.
DUKE Man, I can't wait to get back to Buster, Tony.
CAPCOM Right.
DUKE It's really some crater.
CAPCOM As you come around there, there is a rock
in the near field on this rim that has some white on the top
of it, we'd like you to pick it up as a grab sample.
DUKE This one right here.
CAPCOM That's it.
DUKE This one right here?
CAPCOM That's it. You got it right there.

DUKE Okay, that's a --
YOUNG That's a football size rock.
DUKE It's a great Scott size.
YOUNG Are you sure you want a rock that big,
Houston?
CAPCOM Yeah, let's go ahead and get it.
YOUNG That's 20 pounds of rock right there.
DUKE Okay. It has some big clasp in it, John.
It sure has.
PAO That's Charlie Duke scooping that rock up
using a technique developed by Dave Scott on Apollo 15.
DUKE In the plum crater getting this rock.
(garbled) has had it.
CAPCOM We agree.
DUKE Okay, I've got it. That's 20 pounds of
rock.
YOUNG Ya want to put it in here, Charlie?

YOUNG I'd just as soon you didn't.
 DUKE Look at the size of that (garbled).
 YOUNG I know it.
 DUKE Ah, Tony, it's got some beautiful crystals
 in it though. That was a good guess.
 CAPCOM Good show.
 DUKE Okay, put it in there, John.
 YOUNG Put it in where?
 DUKE In your SCB.
 YOUNG I don't think it will fit.
 YOUNG Don't think it will fit.
 DUKE It ain't going to fit.
 YOUNG Put it under your seat.
 DUKE Ya.
 DUKE Kinda dusty.
 DUKE Hey, do you want some more bags here?
 YOUNG Yeah.
 DUKE Okay, here you, here's you a good one. Okay,
 Tony, I'm going to put that little glass ball, that I haven't
 sacked yet. Look at that John.
 YOUNG Yeah, it is a big piece of glass.
 DUKE Solid glass.
 YOUNG Black glass.
 DUKE Going into bag 4.
 CAPCOM Okay, we'll need an EMU check before you
 drive off.
 DUKE Standby.
 YOUNG Yeah, I'm running at 48 percent, 3.87. I'm
 on half way between intermediate and terminal and I didn't have
 any flags. We got to do something with this bag before we leave,
 Charlie.
 DUKE Put it under your seat. Under my seat.
 DUKE Okay, Tony, I'm clear on the flags. My frame
 count is 65, got ---
 YOUNG What you got, Charlie?
 DUKE Looks like I'm about 35 percent and I'm
 between intermediate and min and I'm at 385.
 CAPCOM Okay.
 YOUNG Yeah, make sure you're in, min, I guess, before we
 get in and start driving.
 DUKE Yeah. Going to min. That's a good point.
 Thanks.
 YOUNG Okay.
 DUKE Beeps. Single bound
 YOUNG Mode switch is going to 1 Houston.
 YOUNG I'm going to position your TV horizontal
 and see if (garbled) which it almost is.
 YOUNG It is.
 YOUNG You saved me a lot of work there.

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 15:58 GET 124:14 MC-467/4

PAO This is Apollo Control at 124 hours 24 minutes.
We are allowing about 10 minutes for the drive back to Spook
Crater and they'll spend about 19 minutes at Spook Crater collect-
ing samples.

YOUNG Let me get it for you. (garble)

YOUNG Yeah, you got it.

DUKE Okay.

DUKE Boy, this is a nice belt.

YOUNG Okay, we're in mode switch one on the TV.

Oh to gold --.

END OF TAPE

YOUNG Can you see my pen over there, Charlie?
 DUKE Can I see what?
 YOUNG Can you see whether I'm about to pull out
 my pin or not.
 DUKE Pull up your tent?
 YOUNG Pull out my pin.
 DUKE Oh, I can't see. No it doesn't look like it.
 YOUNG Man, are we filthy.
 YOUNG Okay.
 DUKE Okay.
 YOUNG Go to (garble)
 DUKE Okay, Tony, we're just about underway.
 YOUNG Okay, we're going to follow our footsteps
 back.
 DUKE Okay, that's a good idea.
 DUKE Tony, did you read?
 CAPCOM Yeah, we sure did.
 CAPCOM Okay, and we're looking at --
 DUKE Okay, we're underway.
 CAPCOM Okay, we're looking at a few changes at
 Spook. We're going to cut that station down to about 19 min-
 utes. And if you get there in time we'll have John go ahead
 as nominal and do the LPM and then we'll enter the LPM tape meas-
 urement and Charlie, you can do your 500 millimeter near the
 end of Spook, and do a pan near the rim of Spook, and why don't
 you do a couple samples of Buster if you have time left.
 And that'll be our station two.
 DUKE Okay, why the cut back.
 CAPCOM Okay, it's your water consumption there,
 Charlie.
 DUKE Ah RATS!! Okay.
 CAPCOM That's all right -- it's just -- you're
 really getting some good geology there, don't feel bad.
 DUKE Okay, we're making good time going back,
 and it's easier looking -- going upsun. You can see the craters
 a lot better. The regolith -- the characteristics of the
 regolith are the same.
 YOUNG Are you using the 16, Charlie?
 DUKE No.
 YOUNG Well, it ain't easier for me. If I wasn't
 following these tracks it would be bad -- upsun or downsun --
 it's bad for driving.
 CAPCOM We figured it probably would be.
 DUKE You're making great time, John, we're doing
 11 clicks!
 CAPCOM Outstanding.
 DUKE Super!
 CAPCOM The Grand Prix driver is at it again.

DUKE Barney Oldfield.
YOUNG I could follow a road.
CAPCOM Back to the on-off switch mode.
CAPCOM John, did you get that TV lens?
DUKE I dumped it somewhere.
CAPCOM Okay, fine.
YOUNG I don't remember if it was that station or
not.
YOUNG Okay, I guess we'll need a dusting again
at this next stop.
DUKE Alrighty.
DUKE Okay, Tony, as I look upsun here going back
through the -- you can see these lineations, mostly furrows, I'd
call them with randm orientations. And they're definit-
ely the Sun casting shadows into unconsolidated regolith.
CAPCOM Right.
DUKE You can't believe how up and down this, Tony.
CAPCOM How about when you're driving across rays,
do you notice any difference in the Rover tracks?
YOUNG (laughter) I notice an increase in block pop-
ulation. But the tracks you can't see -- they're behind you.
CAPCOM Okay, I thought maybe you could see them be-
hind the front wheel there.
YOUNG (laughter) It's a cloud of dust, Tony!
CAPCOM Okay, we copy.
DUKE Isn't that -- that looks -- that's Spook,
isn't it? That big one right there?
YOUNG Yeah, I think it is. That's the one we called
Buster.
DUKE Okay.
YOUNG We got to go up north if you're going to - -
DUKE Okay, Tony, we're in real blocky boulder field
here. It's probably thrown out from Spook. What we originally
called Spook was not Spook. I think this blocky one is Spook.
And we're coming up from the South side of it.
YOUNG Yeah, I'd say Houston, that I was further
past -- I guess that I was further past Double Spot.
DUKE But we got 8/10 of a mile, John, and Spook
is suppose to be a mile -- that -- that's got to be it right
down there.
YOUNG Buster?
DUKE No that's Spook.
CAPCOM Okay, Spook should look about the same size
as Flag.
YOUNG How about it. Does it look the same size?
DUKE No, this is the biggest crater -- right over
here to the right.
YOUNG Okay, well, this is Buster.

DUKE Okay, that's what I thought. It's a blocky crater.

YOUNG You want to stop the Rover half way between them?

DUKE Yeah.

CAPCOM No, near the edge of Spook.

DUKE It's a lot bigger than -- yeah, okay, it's about (garble) meters or so. We're bearing 089.8.

CAPCOM Copy that.

DUKE We're supposed to park 180 about half way, John.

YOUNG We're in a big hole back over here, can you (garble)

CAPCOM Little bit nearer to the end of Spook so we can see into Spook.

DUKE What you really want to see into is Buster. Buster is about the same size as what we call Spook here. In fact it's a more impressive crater.

CAPCOM Okay, whatever turns you on, there.

DUKE John, that thing's -- that, that's got to be -- Tony, is there a big crater to the south of Spook.

YOUNG Cove is

CAPCOM That would be quite a ways. Where it red rose is, looks about 8/10 of a kilometer.

DUKE No. Okay, well let's park here John. This is great sampling. We've got plenty boulders and everything.

YOUNG Alright, let's do it right here. We concur.

DUKE The Buster is a lot bigger than Plum is. The one we call Plum.

CAPCOM Right, it should be.

YOUNG Right, it sure is.

DUKE Okay, then we got the right place then if it should be. Okay, we're stopped and we're 180 087 2.8 .8 115 115 72 72 100 100 off scale low off scale low.

CAPCOM Okay, we copy.

DUKE Okay, pan 1 up on Spook crater.

YOUNG I can't believe it, Charlie.

DUKE What? You did it again?

YOUNG My hammer just got hung up in the instrument panel.

DUKE I know it. I saw that, it was on those stations there. I'm sorry, I should have said something to you.

YOUNG Okay, well I won't need it. Do you need it?

DUKE No.

YOUNG (garble) the seats. I'm going to put this thing back in one more time.

DUKE Charlie, you're kidding.

YOUNG No.

DUKE Okay, I'll put it in, come on over. You

DUKE start the LPM, and I'll be over in just a
minute.

YOUNG Okay, when I get the antenna up.

DUKE Okay.

CAPCOM Okay, Charlie, are you on a ray there, or --
I know the block's angular.

DUKE The blocks are angular, but they are defin-
itely coming out of Buster.

CAPCOM Okay, very good.

DUKE They dissipate very quickly. In fact they don't
even come to Flag.

END OF TAPE

DUKE -- very quickly, in fact, they don't even
come to Flag.

CAPCOM Okay.

CAPCOM Hey, we've got a TV picture.

YOUNG (Garble) is a really impressive crater

DUKE John? Ol' Orion!

YOUNG Where is it, Charlie?

DUKE Right -- just to the left -- right under
the Sun, as a matter of fact, --

YOUNG -- by golly, we did park it in the right
place!

DUKE I think we did!

YOUNG Which way?

DUKE I think we did!

YOUNG Somebody's working the TV, and it ain't
even locked up yet!

CAPCOM Okay, John, we'll need to press on with
that LPM, or we won't get it done.

YOUNG Got your point, (Garble).

DUKE Okay, since you don't do just -- The LPM,
John, and I'm going to do the 500, I won't put your bag back
on. Okay?

YOUNG Okay, take that time --

DUKE Okay, Tony, under here again, right under
the regolith, the first centimeter or so, we have the white
albedo material.

CAPCOM Understand. Hey, that does a good job
on lens there.

YOUNG Your eye looks clear to me here, Houston.

CAPCOM Yeah, that helped a lot.

YOUNG And the Earth is to be locked up, I
guess. And the Earth is Borsighted in the Boresight Machine.

DUKE Thirty - okay. That's going to be cross
sun so I'm going to do it at F8.

CAPCOM That's a deep (garble) there isn't it?

DUKE How you read me Houston?

CAPCOM We copy you fine.

DUKE Sounds like you're reading us.

YOUNG Steve was your TV Charlie, fix this
thing for me? Oh!

DUKE Let me take these pictures.

YOUNG Charlie.

DUKE Hugh?

YOUNG I've got to do this LPM.

DUKE Okay.

DUKE You don't want to go ahead and get
started with this?

YOUNG I want us to do it, but I --

DUKE Okay, okay, okay.

DUKE Houston, do you read, over?

CAPCOM Ah, we're copying 5 by, how us?

YOUNG Did you knock your mode switch off?
 YOUNG Did I knock mine off?
 DUKE I'm -- we're both in AR.
 CAPCOM John, and Charlie, this is Houston, do
 you copy?
 YOUNG Yeah, loud and clear. Where you been?
 CAPCOM I, well, you've been here all the time,
 I -- I don't know.
 CAPCOM Got great TV -- really fine.
 DUKE Okay, there it is.
 YOUNG What am I hung up on now, Charlie?
 DUKE Okay, you got on that what-cha-ma-call-it
 that --
 YOUNG -- hangs out there.
 DUKE -- that hangs out there. Yeah.
 YOUNG Okay.
 YOUNG Okay.
 YOUNG No LPM.
 DUKE Hey, Tony, I'm going to take a view of
 South Ray, here, with the 500. We got a good view of it
 here.
 YOUNG Okay, the LPM is -- got its sensor head
 on it, and the power switch is coming on, mark.
 CAPCOM Okay.
 YOUNG And the temperature label says nothing.
 CAPCOM Alright.
 DUKE Okay, Tony, the 500 millimeter is up to 50.
 CAPCOM Okay, we copy that.
 DUKE I guess I took a few too many. I had a
 triple, vertical, stereo pan on Stone Mt. and about 5 frames
 on ol' North and South Ray, over.
 CAPCOM Okay, we copy that.
 DUKE Okay, I'm finished with my pan, and the 500
 I'm going to run over the Buster and do some sampling, over.
 YOUNG Buster is really a impressive crater,
 Houston. The walls just aren't steep and the blocks are
 all over it.
 CAPCOM Okay, we copy that, and Charlie, sounds like
 you've got a good plan there.
 DUKE Okay. And if you'll notice I'm carrying
 John's bag, and a shovel, and I'm not taking a gnomon.
 YOUNG Okay.
 DUKE Man, that's going to be a little steep
 bridge to climb.
 DUKE You get -- yeow whee! Man, John, I tell
 you this is some sight up here -- looking out into that
 beaut! Tony, the blocks in Buster are covered -- the
 bottom is covered with blocks -- the largest 5 meters across.
 The sides -- the blocks seem to be a preferred orientation,
 northeast to southwest -- they go all the way up the wall
 on those two sides, and on the other side, you can only

DUKE barely see them outcropping in about 5%.
Ninety percent of the bottom is covered with blocks that are
50 centimeters and larger, and I get a partial pan into
there --

CAPCOM Good show, it makes it sound like a
secondary.

DUKE -- and --

YOUNG I know, boy.

YOUNG Okay, Houston, I'm back the sensor number
1 is on there and mark.

CAPCOM Okay, we start the clock.

DUKE If that is a secondary, that is a BIG
rock that hit in there.

CAPCOM Rog.

DUKE The rocks in there are very fractured
though. The rocks down there are extremely fractured --
you can see a major fracture set running -- dipping about
north 30 degrees on one rock. The other one is subhorizontal,
so it's just a very impressive sight as far as the boulder
goes. They're all angular. Some of them -- well, I call
some of them some around it, but the majority of them are
angular, and they have a grayish texture to them, and that's
about all I can tell. I got a partial pan from up here on
the rim, and I'm going to start sampling.

CAPCOM Okay, it sounds good, Charlie, and why
don't you start some of the sampling now?

CAPCOM And, the time's up.

DUKE Alright.

YOUNG Okay, can --

END OF TAPE

SC Pete, looking out of the hatch window towards the back at the (garble) is even getting more stunning. And this brilliant whites and grays against the stark black background looks like the (garble).

CAPCOM Roger.

PAO That was Charlie Duke giving us a visual description of the Moon from a distance of 7200 nautical miles. We are working on some central standard time conversion figures which we'll pass along to you shortly. We'd like to get those checked and verified by the flight activities officer. We hope that will assist in the process of converting the updated GET time to a central standard time.

SC Hey, Pete, how far out from the Moon are we now?

CAPCOM How far out from the Moon?

SC Yeah.

CAPCOM Standby a minute.

CAPCOM Charlie, you're 7294 miles out.

SC Thank you.

SC Hey, Pete, we would like to send you a picture of this if ya'll got -- can tape the TV. This is really a spectacular sight!

CAPCOM Okay, standby Charlie, we'll see what we can do.

PAO That was Charlie Duke telling us he'd like to send us some TV. Our network controller is -- says we're working that right now. The primary problem, of course, is to get the necessary ground lines up --

SPEAKER -- toward items into the flight plan at 226:40 --

PAO And network says we just happen to have lines coming up for television that we were planning to receive from the lunar communications relay unit on the Moon's surface. So we hope that if we can get things in configuration, we'll attempt to get a television picture from the Command Module of the lunar surface.

CAPCOM Get that camera out and we'll work up the lines here.

SC Okay. Okay 226:40 go ahead.

CAPCOM Okay, at 226:40 we want to retrack mapping camera, close the door, put the mapping camera in standby, put the X-ray in standby, and then pick up at 226:50 there in the flight plan.

SC Okay, (garble)

PAO This is Apollo Control again to --

CAPCOM Negative. I guess we lost comment temporary -- say again Charlie.

SC Okay, you gave us a flight plan update for

CAPCOM Sure did. And Charlie, we'll be leaving
as soon as John finishes.

DUKE Okay. Okay, there's another rock going
into bag 7.

CAPCOM Okay, bag 7.

DUKE Dust covered. And I'm going to go out and
get - okay I'm going about a quarter of a diameter away from
Buster and sample some more.

CAPCOM Okay.

DUKE The rim of Buster is pretty good slope
climbing up there, Tony.

YOUNG Okay.

DUKE How long have we been out, Tony.

YOUNG A couple of hours, Charlie.

CAPCOM 545, Charlie and I've got a mark down.

DUKE Alright Tony.

DUKE The only trouble is that you can't put
the bag -

CAPCOM Okay, John.

YOUNG Okay, X is 104, Y 403, Z 423, X 107, Y 404,
Z 425, X 110, Y 405, Z 425.

CAPCOM Okay, outstanding and visor down.

YOUNG Did you get those, Houston.

CAPCOM Sure did.

YOUNG Visor is down.

DUKE Okay, Tony, this is a - the rock I've got
here -

YOUNG Read switch is off and the power switch is
off.

DUKE - is a very friable rock and it's the most
shocked rock I've ever seen, it's just pure white. The whole
matrix is pure white. And it's not a breccia. Hey, John I
hate to tell you this but I dropped my bag.

YOUNG I'll get it.

DUKE They can't guess what happened. The little
thing I didn't - it came unlocked.

YOUNG You've got to take the -

DUKE No, not that. It was just the top thing.

YOUNG This is really some rock, really shocked.
Okay, move back and let's get it on the flap, Charlie.

CAPCOM Okay, and as soon as you get buttoned up
there we'll taking off.

YOUNG Okay.

DUKE And Tony on this friable rock - this
shocked one, it's a very friable and I'm going to try and get
it in the bag but I'm not sure it's going to go. And If I
don't get it in the bag I don't think it's going to survive.
Well that's part of it in the bag, anyway.

CAPCOM That'll do fine.

DUKE It broke in two in my hand.

CAPCOM Geochemists are always telling us how
little rock they need.
DUKE Okay, and that's in bag number 9.
CAPCOM Okay, bag 9.
DUKE They are going to get a lot of nice -
their going to get a lot of nice rock samples today.
CAPCOM Good show, it sure sounds that way.
YOUNG Nice little rocks.
CAPCOM Sounds like a lot of rocks.
DUKE That was a real balancing act Tony.
YOUNG And if somebody cleans our suits they can
get another 5 pounds.
CAPCOM That's our comprehensive sample.
YOUNG Now, here comes the interesting part.
DUKE Very good, John.
YOUNG Ed was right it does wind up on itself.
CAPCOM Yes, Ed's sitting here chuckling.
YOUNG Will it unwind on itself?

END OF TAPE

DUKE That's very near (garbled)
YOUNG It might unwind on itself.
DUKE Yeah. Look at that thing. It's like a bowl of spaghetti.
YOUNG What I hope is, it doesn't go into the mouth of the --
CAPCOM Well, you're doing pretty good there, John.
YOUNG Oh, yeah.
DUKE Okay, bag number 10, Tony, is another one.
CAPCOM Okay, bag 10.
DUKE It's an angular rock.
CAPCOM Charlie, we better get you loaded back up.
DUKE I was worried about that fire cape.
CAPCOM Say again, John.
YOUNG I was worried about - on the geophone experiment, huh?
DUKE They want us to load up, John, I guess they are - I'm running out of water.
YOUNG Okay.
CAPCOM John, go ahead with what you were saying.
YOUNG I said, have we got a problem of some kind. Are we needing to get Charlie back?
CAPCOM It's no problem. We're just trying to -- You're a little bit late on this station and to get everything in and so to get back in in time, we might be a little late.
YOUNG Okay.
DUKE We understand.
CAPCOM Right. We are going to shorten the EVA by about 8 minutes is all.
DUKE 8 minutes. (laughs) We'll settle for that.
PAO Crew hasnow been on the lunar surface for 5 hours 51 minutes. And we have one hour remaining in this EVA.
DUKE This one's going into bag 11, Tony.
CAPCOM Okay, bag 11.
DUKE And here, Tony, I don't really see - that's a sack full, John. I don't see the high albedo stuff underneath -.
YOUNG Well, I think it is in as good as I can put it back in, Houston. But I wouldn't be surprised to see it hanging out some day.
DUKE Houston, I hate to tell you this, but those rocks, these light ones here, they look like caliche to me.
CAPCOM Well, who knows?
DUKE Okay, Houston, we're going frame switch to one and CCW. You already got it in CCW?
YOUNG Yes.

YOUNG Mode switch is going to 1, Houston.
 CAPCOM Okay. And --
 DUKE You just got mine. I gave you the last
 rate count on the - on the IPM.
 CAPCOM Right.
 YOUNG (Noise) Really works great.
 DUKE Man, the old pallet is closed - boxed
 right in there. Look at this beauty.
 YOUNG Did Charlie check minimum on the coolant.
 DUKE Oh, Yeah.
 DUKE There we go. I did it that time.
 CAPCOM And John, can you check and make sure your
 purge valve didn't fill in.
 YOUNG Again Charlie.
 DUKE Ain't no way I could tell it's a good view
 there.
 CAPCOM Out standing.
 DUKE We are married upon the vehicle, as they
 say, Houston.
 CAPCOM That skill is off (garbled)
 DUKE Okay.
 DUKE Yeah, I'm going to take some pictures -
 Wow, is that sun bright. Oh -- There at home, do you see it?
 CAPCOM Yeah.
 DUKE John, you're not going right. That navi-
 gation has us right on. You turn to 086, we'd be pointed
 right at that beauty.
 YOUNG Let's do that.
 DUKE Look at it, John. 4 more degrees and you
 got it. Stop her. Your're 87 now. You're about 084 and where
 did you have it?
 YOUNG (garbled)
 DUKE You're going to have that big crater.
 Man, this is a fun ride.
 DUKE Okay, Tony, we're doing 10 clicks.
 CAPCOM Outstanding.
 DUKE Occasionally the back end breaks - occasionally
 the back end breaks loose, but there is no problem. This is really
 some machine.
 PAO We're allowing about 5 mintes for the
 drive to station 3. This will be a very brief stop. We won't
 have TV at this station, but expect to have the TV up when
 they return to the lunar module.
 DUKE Backfired.
 DUKE It's just like driving on snow, Houston.
 By golly.
 CAPCOM Yeah, I know all about that.
 YOUNG I know you do, but us Florida boys
 don't know much about it.

DUKE It takes these small craters up to a meter just like a piece of cake. You occasionally get blinded by the LCRU mirrors and the DCU mirrors.

YOUNG And the Sun!

DUKE That's what I meant. Oh, you mean - and I got my thing down.

YOUNG That is a good idea.

DUKE Look at there. You can see your flags out, John.

YOUNG Yeah.

CAPCOM And Charlie, could you look at the amps during the higher speed part. We'd like a number.

YOUNG Okay, well let us get a high speed part.

DUKE The voltage is - the switches on volts right now, John, and I don't want to move (garbled)

YOUNG Yeah, if Charlie moves a switch while we're driving, I'll turned right - left every time.

CAPCOM We understand.

YOUNG By gosh, this is really something.

DUKE Yes.

YOUNG Yeah, man.

DUKE Ya-a-a hoooo!

YOUNG Huh-ho-ho-ho!

DUKE Look at that thing dig in.

YOUNG Boy, we just missed a dandy.

CAPCOM Are you steering on all 4 wheels?

DUKE Yep.

CAPCOM No proble?

DUKE No, I was really going slow at first. I think it would be a problem with your navigation under unknown terrain.

DUKE Hey, we've been making about 10 clicks, Tony, and going just super.

CAPCOM Outstanding.

YOUNG Well, you see, going down sun or into the sun which we're not going to be doing much of any more is really, you can't, you can't plan ahead far enough to do yourself any good.

CAPCOM Rog.

YOUNG That's why I was going so slow there at first.

DUKE Hey, John, we need to stop out here for the Grand Prix.

YOUNG Okay.

DUKE And it's a --

YOUNG Here's a flat place for it.

DUKE Wait, we got to get over there where the - I'd like to get back over there so I won't have to get back on, see, and pick up the cores then.

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 16:37 GET 127:54 471/4

YOUNG Okay, I got you.

DUKE You've got to arm the mortar package change station to switch by CCW.

YOUNG (garbled)

DUKE Why don't we go over to the right, where the stems are. Got more sighted on the LSM now.

YOUNG Yeah.

DUKE Hey, here's a big one, John.

YOUNG Oh, man.

DUKE Hook a right.

DUKE Tony, again we just driving by the -- the
ALSEP and --

END OF TAPE

DUKE Tony, again we just driving by the ALSEP and apologize for that heat flow, I wouldn't trade you, the drill seems to work just great though. I think it's real -- it's in good shape right now for next flight.

CAPCOM Good show, Charlie.

YOUNG Okay, there's a flat place right in here, Charlie.

DUKE Yeah, that's what I was thinking, see you can go out up that way and then out over that way towards the LM, okay.

YOUNG Right, right.

DUKE Okay, let me jump off.

YOUNG A day ago it didn't look like we were even going to land and now we've sampled our first highlands, I feel pretty good about the science without the heat flow.

DUKE Well I know, Marks, disappointed and I sure am. Frankly, that was just a real shame. That was my big moment -- was to get that thing going. Putting this camera in here, John, okay?

YOUNG Yep.

DUKE Okay, now let me see, you were supposed to drive 45% to the sun, okay.

YOUNG Yep.

DUKE Okay, let me get this 16 off.

YOUNG I did it from there up towards this way, okay?

DUKE Wait a minute, okay which way you going to drive? From here to this way? Going over this stone?

YOUNG You see where that white thing is?

DUKE Yeah.

YOUNG I -- I'm going over there towards a rock and drive up this way.

DUKE Okay, well wait -- why don't you just drive towards the LM, let me move out here and you can drive towards the LM, turn around and then drive towards Stone.

YOUNG Okay.

DUKE Okay.

YOUNG Okay.

DUKE Let me get the camera. Let me get it set here, now it's 24 going to be using the trigger so it's 24, and F-8 250. That LM makes a nice looking house.

CAPCOM Especially since it's about the only one there.

DUKE Yeah, your right, Tony, it ain't much up here but a lot of rocks.

YOUNG Hope the door opens, Charlie.

DUKE Huh? What?

YOUNG I said I hope the door opens. It'll open.

DUKE This thing is stuck. I can't get it open

DUKE Let me move out.

YOUNG Okay, to start I'm supposed to be about 50 meters or so from you. Okay, Charlie, what I'll do is drive from A to B, standing start, maximum velocity readout, and do some -- I'm not going to do much steering control around here other than to avoid regular craters. We'll have to do that any way.

DUKE Yeah. Okay, I'm ready.

YOUNG I'm not going to break it. To amount to anything.

DUKE That's all mark. That maximum acceleration?

YOUNG No.

DUKE Man you are really bouting it.

CAPCOM Is he on the ground at all?

YOUNG 10 kilometers.

YOUNG Huh?

DUKE He's got about 2 wheels on the ground. It's a big rooster tail out of all 4 wheels, and as he turns he skids the back end, breaks lose just like on snow. Come on back, John. And DAC is running. Man I'll tell you Indy's never seen a driver like this. Hey when he hits the craters it starts bouncing it's when he gets his rooster tail. He makes sharp turns. Hey that was a good stop, those wheels just locked. Mark OFF.

CAPCOM Okay. Do you want to do it one more time?

YOUNG Yeah, in about a minute and 5 seconds, I think.

DUKE Okay, mark ON. Okay, you could have gone the other way, but go ahead. There's a big crater there though aren't they.

YOUNG Yeah, I don't want to fall in those holes.

DUKE Yeah.

DUKE They want 4 minutes worth, John. That was a minute and 5. See if you can do it in twice more.

YOUNG Charlie.

DUKE Okay, turn sharp.

YOUNG I have no desire to turn sharp.

YOUNG Okay, here's a sharpie.

DUKE Hey that's great. Man those things -- when those wheels really dig in, John, John, is when you turn is when you get the rooster tail.

YOUNG Charlie.

DUKE The suspension system on that thing is fantastic.

CAPCOM That sounds good, we sound like we probably got enough of the Grand Prix, we're willing to let you go on from here. Call that a Grand Prix.

DUKE Okay. Man that was all 4 wheels off the ground, there. Okay, max stop.

YOUNG Okay, I don't want to do that.

DUKE Okay, excuse me.

YOUNG They say that's a no-no.
 DUKE Okay, DAC OFF. MARK. Okay, John, DACs OFF.
 YOUNG Okay. I have a lot of confidence in the
 stability of this contraction.
 DUKE Me too.
 CAPCOM Sounds great.
 DUKE Okay, you got to dismount arm the mortar
 packages.
 YOUNG Okay, where's your core tubes at, Charlie?
 DUKE I'll get them.
 YOUNG Okay, well I'll stop it --
 DUKE Go ahead I'm going to run back in.
 YOUNG I knew you'd rather get out and walk.
 DUKE That's right.
 CAPCOM After he saw the way you drove.
 YOUNG Well when, Charlie's, in here it's a lot
 less bouncy.
 YOUNG And that's the truth.
 YOUNG I should say some less bouncy.
 CAPCOM John, you're going to get a feed water
 tone, in the near future.
 YOUNG Okay.
 DUKE Man I can't believe mines going through
 that much faster. Course I sweat like crazy? Always have. Okay,
 Tony, I'm jogging back in.
 CAPCOM Okay.
 YOUNG Charlie, I can't get my seat belt off.
 DUKE Uh oh.
 YOUNG See if you can come tell me what the prob-
 lem is.
 DUKE Hey, you don't have it -- you don't have
 it unlocked. Now let it go. No you don't have it unlocked,
 John. It's -- got it over center. Push it -- now let your
 hand go. See -- wait a minute, now, you got to let this thing
 go -- your pushing here.
 YOUNG Oh, okay.
 DUKE Okay, let it --
 YOUNG Okay, I can't -- I couldn't see it.
 DUKE Now there you go.
 YOUNG Okay, fine.
 DUKE There you go.
 YOUNG Thank you.
 DUKE You are filthy.
 YOUNG I tell you there's the pot calling the
 kettle black.
 DUKE Man, there's a beautiful secondary, Tony.
 CAPCOM Is it oblong or round.
 DUKE Meter size. It's round with a very

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DUKE angular block in it.

CAPCOM I guess we don't have time to look at it,
Charlie.

YOUNG And my purge valve is still and strong.

DUKE No I'm going to press on.

CAPCOM Okay.

DUKE I didn't even stop.

YOUNG Gee, we could have called that a seat belt
stop. That's what it was.

DUKE Tony, the rocks in this ray, near the
lunar module are entirely different from the ones we've been
sampling.

END OF TAPE

DUKE Tony, the rocks in this ray near the Lunar Module are entirely different from the ones we've been sampling. Uh, they're just different. We're going to have to make a stop here -- station 10 and call station 10 right here right in front of the Lunar Module and sample here.

CAPCOM Okay, sounds like a good plan.

DUKE Wow, I'm in the dark -- I'm at the LM (garble). Okay, I ran to the third mark down from full -- whatever that is, 50, I guess, I ran looks like 50% of the mag, Tony.

CAPCOM Okay, I've got about about 2 minutes and 10 seconds, so that should be about right.

DUKE That's about right, then.

YOUNG Okay, first arming pin is out. Second pin is going to arm. Third pin is going to arm. This is as far as it goes with the arms. Now they've all be armed either that or the pins are broke off. Okay, at 65 we'll go PCW.

CAPCOM Okay.

DUKE After you've been out in that Sun awhile, this shadow is really dark. Hey, Tony, the cords are in the bag, breaking out the solar wind.

CAPCOM Okay.

CAPCOM Okay, Houston, did that mortar peg move at all when you pulled the pins out?

YOUNG It moved, but it's level still.

CAPCOM Okay.

DUKE Is there anything else you want me to do while I'm out here, Houston?

CAPCOM Negative.

YOUNG No, let's head on in.

DUKE Okay.

DUKE Ah, here it says sun --

YOUNG Yeah, we figured out where that is.

DUKE This is foolproof! Point this side at Sun dummy. Okay, solar wind is planted in the Descartes highlands. Figure out where what is?

YOUNG The Sun.

DUKE Oh, I was reading the SWC.

YOUNG Oh, (laughter).

CAPCOM Okay, Charlie, sounds good.

DUKE Hey, I got a -- okay, Houston, bearing 022 range 110 and that's where IT IS! And that is no joke!

CAPCOM I understand.

DUKE That's where we aligned it at -- that is FANTASTIC!

YOUNG You want to read these numbers off, or you just want to head out?

CAPCO Let's have 'em.

CAPCOM Alright John, we'll take those numbers.
YOUNG Well, they're already gone.
CAPCOM That's okay.
YOUNG Been wrapped now.
CAPCOM Okay, we'll get them when you depart.
YOUNG Okay.
DUKE Hey, there's nothing -- there's nothing
plain about this place, Houston, I'll tell you, I don't know
whoever thought it was plain -- Cayley Plains -- MAN!
DUKE Okay, Houston, these rocks -- I picked up
one --
CAPCOM (garble)
DUKE -- right out here that I described that blue
one that I described from the Lunar Module window, and my blue
is colored because it is glass coated, but underneath the glass
it's a crystalline rock -- that to me has the same texture as
the Genesis Rock, and it's not a breccia. At least I can't --
the part I'm looking about at is it's not a breccia -- maybe just
one big class, but the part I'm looking at is a one solid
It's an igneous plutonic rock.
CAPCOM Okay, how big was it?
DUKE It's about football size...little bit smaller.
Going into +Z footpad.
YOUNG Okay, Houston, you're readings are... we're
parked on a heading up North. And it says the bearings is 355,
the range is 0, the distance is 4.2. It says the amp-hours
are 108, 105, and a volt 68 and 68. The AMP's of course are
0. On a one battery temperature is 104 and one is 105. The
number two is 105. The fourth motor temps is off scale low
and the rear motor temps are off scale low. And then it might --
might
DUKE My water flag a hold.
CAPCOM Rog, you have water flag.
DUKE Turn on the outs 1
YOUNG Huh.
DUKE Okay. Tony, can I take the pictures of the
SWC with my black and white?
CAPCOM Stand by a second.
DUKE I've already got it on, I hope you say yes.
CAPCOM Yeah, go ahead.
DUKE Okay. Thank you.
DUKE Okay, Houston. You're going to 3.
CAPCOM Okay.
YOUNG Yeah, Everyone of them. I don't see any that
has two craters.
DUKE We might have missed some but I agree I didn't --
YOUNG Tony I'd say 15, 15 percent of our rocks are
glass coated and that the other stop 42 we didn't see any.

CAPCOM And Charlie while you got the camera taking pictures there. We'd like you to go around and look at that cosmic ray and take a picture of it. And read off a temp.

DUKE Okay, I've already taken a picture of it.

CAPCOM Okay. We're going to need a temporal label reading.

YOUNG (garble) in color and we're going to need a temporal label reading.

DUKE Okay, I'll go read the temp. You want another picture.

CAPCOM No, we don't need another picture. You might comment if there's any dust on it.

DUKE No, it's clean as a whistle. And buddy it is - - must be high although the label all three on each side are black. It's over a hundred - -

END OF TAPE

DUKE No, it's clean as a whistle. And Buddy, it is - must be high in all of the labels. All three on each side are black. It's over 140.

CAPCOM Okay, we'd like you to take it off and put it on the minus Y stretch, in the shade.

DUKE Okay, John will have to do that.

CAPCOM Okay.

YOUNG Okay.

PAO This is Apollo Control. While we're waiting for the crew to get the high gain antenna aligned properly and get the communications reestablished, we'd like to report that all continues to go well with CASPER. Ken Mattingly in the 26th orbit and all experiments are working well.

DUKE You know, I think we've raised this thing too high.

YOUNG Okay, Houston, you should have us now.

DUKE John, can you take my bag off, I'm ready to press. You've got a whole bag, I emptied yours in their and it wasn't even - it didn't even fill any SRC's so take my bag off and -

YOUNG Okay.

DUKE we'll - I'll get on with this.

CAPCOM Okay, guys, we'd like to switch out the SCB's in the rock box and we'd like to put SCB 5 in there instead of SCB 1.

DUKE Tony, I've already emptied SCB 1 in there.

YOUNG Most of SCB 5 can go in there too, Houston.

DUKE Yes.

CAPCOM Okay, great.

DUKE I think I can get them both in there. I'm emptying them in, Tony.

CAPCOM Good show.

DUKE Okay, Tony, like we planned, I'm empty. I'm just emptying them in there.

CAPCOM Okay.

DUKE It packs easier that way.

YOUNG Boy, LCRU you are dusty.

CAPCOM Thank you, John.

YOUNG Say again.

CAPCOM I said thank you.

YOUNG Okay.

CAPCOM And, Charlie, we'll need your frame count sometime.

DUKE Okay.

YOUNG Okay, Houston, going to reset on the far UV.

CAPCOM And John, we have a new target for you.

YOUNG Okay, go.

CAPCOM 204 Azimuth, elevation 26.
YOUNG Boy, Charlie, you have to watch that bearing cable. It's way up in the air around this thing.
DUKE I know it.
YOUNG Say again the Azimuth, Houston.
CAPCOM 204.
YOUNG No, you keep clipping out your first number.
CAPCOM Roger, that's Azimuth 204 elevation 26.
YOUNG Okay. I can't believe that. Okay, Houston, this thing is getting tighter and tighter and turning in the azimuth I bet you it isn't going to make it much longer. 204 and 26.
CAPCOM Rog.
YOUNG I can't believe it. Okay, 204 and 26.
CAPCOM Sounds good.
YOUNG Okay, it may see a little LM there, Houston. That's what you want, we'll leave it there.
CAPCOM Okay, and we'd like you to go to - John, we'd like you to go to intermediate on your cooling.
YOUNG Yes, okay.
DUKE John, you've got to move the cosmic ray.
YOUNG Oh yes, okay, I'll do that right now.
DUKE Okay, Tony, we've got all the rocks that we collected except for a couple of biggies into the SRC. Over.
CAPCOM Outstanding, Charlie. The reason for putting those others in there is they wanted the soils in the SRC.
DUKE Yes.
YOUNG Okay, White Rain, right Tony?
CAPCOM White Rain, that's right.
YOUNG Darn you, Mother.
DUKE You know I said the battery covers weren't going to get dusty.
YOUNG Houston, I don't know how to tell you this but cosmic ray unlocks down at the bottom, but it won't unlock up at the top. Which way do I push it or pull it?
CAPCOM It should be a lift off. Straight up. correction, straight out.
YOUNG Okay, that's what it is. Fantastic. Okay. It's set now, away from the front on the minus Y.
CAPCOM Okay, that sounds good.
YOUNG Charlie's right, it's up there. Charlie, be careful when you go past the minus Y.
DUKE Okay.
CAPCOM Hey fellows, we're able to see the Earth with your big eye there.
DUKE How about that. Pretty sight, isn't it.
CAPCOM Sure is. Yes, it's weird. Okay.
YOUNG Houston, the way I had to set it to keep the - to keep the - to make it stand up against the strut, it's

YOUNG About, I'd say it has an angle of 50 or 60 degrees to the Sun. And the Sun is shining on the back of it because the strut won't shield it completely, if you know what I mean. The base of it is down in the foot pad and the top of it is out - sticking out past the strut.

CAPCOM Okay, we copy that, John.

YOUNG Tony -

CAPCOM That's no problem, John, that good.

CAPCOM Okay.

DUKE You finished with your pictures, John?

YOUNG No, I haven't done those yet.

DUKE Okay.

DUKE Tony, my frame count on magazine Bravo is

120.

CAPCOM Okay, 120.

DUKE And I'm helping John load up, I'm doing

ETB right now, while he's taking pictures.

CAPCOM Okay.

END OF TAPE

SPEAKER (garble) side (garbel) 6 at 60. 20 feet.
CAPCOM Charlie, was your magazine Bravo or Golf?
DUKE Whatever the one -- whatever the one the
checklist said.
CAPCOM Okay.
DUKE I'll tell you inside, I'm bringing it inside.
CAPCOM Okay, that's fine.
DUKE Okay, I've got all the film John. All
CAPCOM Okay Charlie.
DUKE All I need is your camera and the ETB is going
over the the MESA table. And I got a great big rock, a muley.
Houston, if I dig a down sun, I'll have to stand in front of this
contraption. You want me to do that. In front of the camera
at 3 feet.
CAPCOM I guess if you stand a few feet away from
it, it shouldn't be too bad. Move 8 or 10 feet away though.
DUKE Okay, I'll take it at 8 feet.
DUKE Tony, I take it back, that rock that we
picked up -- the big -- the muley is, oh I was going to say
glass crystals, but take that back, it -- part of it seems to
be shock and it's a crystalline rock on the inside under all the
dust. Whatever it is.
CAPCOM Okay, fine. We'll take it.
DUKE Hey we -- Bob.
CAPCOM That's fine, we'll take it.
DUKE Okay. I dropped -- dropped it onto the strut,
part of it broke off. I'm sorry. Okay, tiny MESA blankets,
I've done that, big rocks I've done. I'm ready to clean EMU's
and stow antennas.
YOUNG Okay, where did my camera go Charlie?
DUKE Right here in the old ETB.
YOUNG What are we going to do with this thing?
Can we throw it away?
DUKE Leave it under the -- throw it away, it's
empty. Pull it straight up, there you go. That crummy thing.
Yeah, well that's okay. There -
CAPCOM Okay, we'd like to the items that you're
transferring up - we'd like to add the pallet one and the
LiOH can.
DUKE Yes sir. Okay John's frame count is 65.
CAPCOM Okay, 65.
DUKE Glad you remembered that Tony.
CAPCOM I just aimed to help.
YOUNG Hey, we have to put that in the pallet, right?
DUKE No, Yeah but hold it. I don't want it to
drop on the dirt. (garble) I think I'll put this ETB over.
(garble)
YOUNG Put the SRC over there too.
DUKE I can do it over the SRC, it's alright John.

YOUNG You can?
DUKE Yeah. I think we over did it a little bit on that MESA. Why does the thing hit the ground, I don't understand that. Never did in training.
YOUNG I don't either Charlie. Maybe we broke the struts.
DUKE I guess maybe you did, it didn't feel like it though. Nice soft Navy landing.
YOUNG 30 g's.
DUKE Hot dog look at that beauty come out of there. Ah ha. Stick it right -- wait a minute -- wait a minute. okay.
CAPCOM Charlie you can adjust that LEC if you want.
DUKE Okay, we will. That velcro -- why don't you velcro that down for me John? John.
YOUNG Yeah?
DUKE Can you velcro that down for me. Excuse me.
Yeah, that's great. Okay, I guess we got to dust and stow antennas.
YOUNG What are you fixing to do with all that stuff Charlie. Don't drop any of it.
DUKE Alright I'm going to take -- put it right over here.
CAPCOM And John when you're working on Charlie there, we noticed he's got some loose straps on his tool harness. You might get those down, otherwise, he'll snag them. Okay, is the cover over the hoods.
YOUNG Yeah.
PAO This EVA has now been running about 6 hours 35 minutes and we'd like to get the crew back in within about 16 minutes.
DUKE Okay, okay turn around and let me check you. You're okay on this side. Let me check the other side. You got a couple dangling too, can you bend over John?
YOUNG Ah rats. (garble)
DUKE Okay, thats got it. Okay, I've placed the core stems on board the SRC HEDC, commander unload, SCB, close SRC 1, MESA blanket, big rocks. Ready for the clean EMU's.
YOUNG I think we're ready for that Charlie. I'll get the LCRU brush.
DUKE Okay, I'll go run get it.
YOUNG I'll get it.
DUKE Let me get it.
YOUNG Okay. Or did you need it.
DUKE Man it doesn't feel like work, it's fun.
YOUNG Yeah.
DUKE You know the only thing tired on me is my

DUKE hands. Fingers really. You'll never get us clean. I think this is a waste of time.

CAPCOM Well we're going to try it anyway Charlie.

YOUNG (garble)

DUKE Coming off. Yeah, it's coming off. I think a good kick on the strut would be the best thing. And I stuck my water --

YOUNG Did you get it over Charlie?

DUKE Yeah. Tony be advised that we are not taking any SCB's up. I emptied the SCB's into the -- into the SRC.

CAPCOM Okay, we copy that.

YOUNG Hey, are we going to get them all in there Charlie?

DUKE Yeah, all the rocks went in there.

CAPCOM You might put -- what are you going to put the big rock in? That might go in the SCB.

DUKE Okay, we -- it will.

YOUNG Won't fit remember.

DUKE No, one of them will. The one I just picked up will. The big one is just -- that we picked up out at flag won't fit.

CAPCOM Okay.

YOUNG Okay. I've got you Charlie, as soon as I can get you. (garble)

DUKE (garble) Got some dirt right in here on -- hold your arms up. Your hose is clean. Can you feel that water running through your hose right there John?

YOUNG Yeah.

DUKE Great feeling. Ah God, guess what I did.

YOUNG Dropped the brush Charlie.

DUKE Dropped the brush.

YOUNG Get it?

DUKE Uh oh. Come on. Hey, I'll start over again.

YOUNG Okay, let me -- dust the dust brush first.

DUKE Okay.

YOUNG You've got alot of it on you too.

DUKE No, that's okay.

CAPCOM Looks like you guys have been playing in a coal bin.

YOUNG Hey, well I'm not so sure we want all this stuff up there in that machine with us.

DUKE I don't know how we're going to get it off.

YOUNG Let's do the best we can.

DUKE Yeah. Let me have --

END OF TAPE

YOUNG Get it there in that machine with us.
DUKE How in the world are we going to get it off.
YOUNG Let's do the best we can.
DUKE Let me have it John.
YOUNG Okay. I promise not to - -
DUKE If you're pockets pretty good John.
YOUNG Take a little while. Okay, take it under
here.
DUKE I tell you Houston my general impression of
this thing is I'm a lot more surprised that how - - how really
beat up this place is. It must be - it must be the oldest
stuff around because it's just craters on top of craters on top
of craters. And there's some really big old subdued craters
that we don't even have mapped on our - - our photo map I'm
sure. Bend over John. Did we just show up this general de-
pression.
YOUNG Okay, that's good as I can do.
CAPCOM Okay, we copy that.
DUKE Tony, one of those big rock bags I can - -
I mean those big rocks I could put into the SRC. It's a un-
documented rock grab sample. I don't mean SRC but the SCB.
Why don't we just leave it there and get it for next time Tony.
YOUNG I tell you what, I'm going to get it. Bag 5.
DUKE Now here's a data point. Just since the time
I dusted LCRU and right now I need to dust it again. Get some
dirt in your eye Houston?
YOUNG Yeah, hold still.
DUKE There you go.
CAPCOM Charley we think that you ought to put the
one that you can get in the SCB, put it in a bag and carry it up.
The one that's too big if there's no where to stow it upstairs why
don't you leave that one down.
DUKE Oh, there's a place to stow it. We just
don't have the big rock bag out.
CAPCOM Oh, we understand. It'll just get a lot of
dust around the cabin with that open rock.
DUKE Okay. Houston do you want your - - do you
want your LCRU covers at 65 percent open today?
CAPCOM That's affirmative.
DUKE And you want your LCRU power switch to go to
off.
CAPCOM Right. And when you get through there, we'd
like to turn the TV away from the sun and point it down.
DUKE Okay.
DUKE Okay. You want me to turn you off before
I move you away and point you down or does it make any difference.
CAPCOM It doesn't make any difference.

CAPCOM Okay, point it and then turn it off.
 DUKE Okay. John come stow my antenna. I'm
 ready to get in.
 YOUNG Okay, Charley. Wait a minute until I get my
 hand clear.
 YOUNG Okay, the LCRU brush is stowed. Okay.
 CAPCOM (garble) back is turned so the batteries
 toward the sun.
 YOUNG (garble)
 DUKE Houston, how do you read? Over.
 CAPCOM Okay, we're copying you John. And verify
 the DAC's turned the battery to the sun.
 DUKE Can you reach it.
 YOUNG No, I can't reach it Charley.
 DUKE Hey, wait a minute.
 YOUNG We're showing
 DUKE I already got them locked up
 YOUNG That's alright. Go ahead.
 DUKE Houston, how do you read? Over.
 CAPCOM We're copying it both fine by us.
 DUKE Now we got you.
 CAPCOM Okay. Good show and John while you're still
 out there we'd like you to confirm that the DAC camera is turned
 with the battery toward the sun.
 YOUNG I fooled you on that one Tony, I did it.
 CAPCOM Okay.
 DUKE Wait a minute.
 YOUNG Okay.
 DUKE That it.
 YOUNG No. Bend over. One time good. Okay, I'm
 just going to velcro it down.
 DUKE That's fine.
 YOUNG Okay. Go. That's the best thing to do.
 DUKE That's okay. Let me - -
 YOUNG Hey, did you get the line?
 DUKE Yes, fine. Like immediately - -
 YOUNG It's doing that before I can get it in that
 little strap there. There it goes.
 DUKE Okay, you're down.
 YOUNG Okay.
 DUKE Okay, I'll tell you what. Let me jump up
 on the ladder and you hand me that, Okay.
 YOUNG Okay.
 DUKE We got an SCB, a ETB, a core stem, and a
 core stem.
 YOUNG Okay.

DUKE Man, would you look at that.
YOUNG Boy, I'd throw the pallet out.
DUKE Yeah, I will.
YOUNG Okay. Do it.
DUKE I got it.
YOUNG Do that alright Charley?
DUKE Yeah. Got a step.
YOUNG You need some help?
DUKE No, I said you just got to step.
YOUNG Do you need some help on getting in there?
DUKE Don't think so.
YOUNG Okay. If you're just gonna - -
DUKE I know it. Got it.
CAPCOM Okay. John, how are you going to carry that
large LiOH can up?
YOUNG Large LiOH can, it's in the pallet - - pallet
Houston.
CAPCOM Okay. Fine.
YOUNG Isn't that where it's suppose to be?
CAPCOM That's fine.
YOUNG Fine.
DUKE There
YOUNG Okay, Tony I'm up on the porch. It's open.
YOUNG Okay. Get these LRV battery covers are pretty
dirty. At least one of them is.
DUKE I'll get them.
YOUNG Guess what?
DUKE What.
YOUNG I'm in.
CAPCOM And John while you're down there verify that
the battery covers - the LRV battery covers are open and the circuit
breakers are all pulled on the LRV.
YOUNG Okay. I verify that the battery covers are
open. I haven't pulled the circuit breakers yet. I'm going over
to dust/ I'm dusting the battery covers, they're dirty.
CAPCOM Okay. I understand.
YOUNG They get dirty - - they get dirty from what
you might expect opening the battery covers.
CAPCOM Okay.
YOUNG I think they're clean before that.
CAPCOM Okay.
YOUNG Okay. Tony on the LiOH cans I verify
2 green. Copy, Toney.
CAPCOM Say again Charley.
YOUNG (garble)
2 green on the LiOH.
CAPCOM Okay. Got that Charley.
YOUNG Got 2 green on the LiOH cans.

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YOUNG Tony, you ain't gonna believe it but the food
is blown up like a balloon.

DUKE You're kidding me.

YOUNG No. It popped out of that stowage. Busted
the snaps. It'll take me a few minutes to do this, emptying
here.

DUKE That's the best I can do your battery Houston,
but I think they'er in pretty good shape.

CAPCOM Okay, John sounds good.

END OF TAPE

DUKE There, John, how is that?
YOUNG When we retracked to the LCRU after
opening the battery covers because that needed doing.
DUKE You can't believe the dirt I've tracked in
here, John.
YOUNG I can believe it Charlie.
DUKE Poor ORION was nice and clean and now she's
filthy.
YOUNG The bus A, B, C, and D come open.
CAPCOM Okay.
YOUNG All four buses open.
YOUNG Okay, Charlie, can I bring you the SRC 1.
DUKE Yes, look, I don't want to hit the camera,
here comes a pallet.
YOUNG Wait a minute, let me - I tell you what -
let me go up on the porch, bring in SRC and you give me the
pallet and I'll bring it back down.
DUKE Alright, that's a good deal.
YOUNG Yes.
DUKE You watch it, that's not as easy as it looks,
John, climbing up there.
YOUNG I know that. I come from a long line of
cowards.
DUKE Okay, here comes a little doma-flitche down.
YOUNG It landed on the porch.
DUKE John, I think it might be easier - are
you on the ladder yet?
YOUNG What?
DUKE Are you on the ladder?
YOUNG Yes.
YOUNG Good, Fall in there, babe. Okay, Charlie,
here comes SRC 1.
DUKE Okay.
YOUNG Can you get it?
DUKE Yes, I think so.
YOUNG Okay, man, that's yours.
DUKE Let me give you this right here.
YOUNG. Okay.
DUKE Got it?
YOUNG keep the scissors, (garble).
DUKE Are you going back down?
YOUNG Yes, we've got the course down, the SCB -
DUKE Yes.
YOUNG and that's it - and then the ETB.
DUKE Rog.
DUKE Hardest point of the whole EVA Tony.

CAPCOM Say again, Charlie.
DUKE I say getting into this moose is the hardest
job of the whole EVA.
DUKE Okay, there's the pallet.
YOUNG Now, what did you bring out with you?
DUKE I brought the pallet. We've got an SCB,
The core stems course down, and ETB.
YOUNG We've got nothing in the SCB, right?
DUKE One big rock is all.
YOUNG Yes.
DUKE That other big mulie we'll get with a big
rock bag later on. See you're doing yours one-handed, John.
YOUNG Right, jumped up to the third rank. All I
can do here is jump. There we go.
DUKE He jumps over buildings with a single
bound, Houston. Faster than a speeding bullet.
YOUNG Okay, Tony, we're bring SCB number 5 in
with the big rock.
CAPCOM Okay, we copy that.
YOUNG Because
YOUNG Wait a minute, you don't have to stick those
up in - Oh, don't kick them back out, Charlie. Hold still.
DUKE I'll get them.
DUKE Can you hand them up?
YOUNG Yes.
DUKE Will they break?
YOUNG No, no.
DUKE Filthy.
YOUNG Here you go.
DUKE Yes.
YOUNG Here your SCB.
DUKE Okay.
YOUNG Okay, let me get your ETB.
DUKE Tony, read out the ETB stuff.
CAPCOM Okay, Charlie, you -
DUKE pull on me.
CAPCOM Right, you have 2 DAC mags, B and D,
3 DAC mags, A, C, and H. 1 500 mm mag L. 3 bag mags, D, C
and R, your maps and 6 sample contingency bags - or containment
bags.
DUKE Okay, now John, I didn't get that.
YOUNG You didn't hear any of it?
DUKE I didn't get those bags. See I don't
have that on my checklist.
YOUNG Okay.
DUKE They're on the MESA.
YOUNG Okay, I'll go get them.

DUKE Okay, they're for these cover bags.
YOUNG Right.
CAPCOM Okay, they're in the left front of the MESA
John.
YOUNG Yes, I know where they're at.
DUKE Okay, now it doesn't hit the deck anymore.
YOUNG Now it hits the deck some more.
DUKE Tony, I've got 658, is that right?
CAPCOM That's right.
DUKE It's right.
DUKE Yes, I think that was the only thing I didn't
have, John.
CAPCOM Roger, you should have 6 DAC mags plus
6 sample bag mags and 3 DAC mags.
DUKE Yes, I've got all the film.
CAPCOM Okay.
YOUNG These bags are on the left side of the MESA,
right Charlie?
DUKE Yes. Have fun. Right where the SWC - I
mean the core stem bags were.
YOUNG Yes, I've got them up here.
CAPCOM And John, maybe you could set the UV, if
you would, before you get off this time.
YOUNG Is it sample containment bags?
DUKE That's right.
YOUNG Oh okay, and underneath that is a flag for
the old what-you-call-it. I'm not sure we have sample containment
bags in there, Charlie. I guess maybe they are.
YOUNG I'll bring them up separate, Charlie.
Do you want me to check the UV before I go up this time.
CAPCOM Yes, it would be a good idea, then you
could just stay up.
YOUNG Oh dear, okay.
DUKE John, when you come up if you remember to
bounce - bounce your foot, put your feet on the struts.
YOUNG Okay.
DUKE It will clean them off, that's what I'm
doing up in the - but mine's on the floor.
YOUNG Okay, EGB 9 that the far UV - what's the
target Houston, I'm over at the far UV.
CAPCOM Okay, reset, and then target is 134
Azimuth.

END OF TAPE

DUKE John when you come up if you remember to bounce, bounce your foot. Put your feet on the struts it'll clean them off. That's what I'm doing up in the -- but mine is on the floor.

YOUNG Okay, ETB (garble)

DUKE That's a 4 UV. What's your target Houston, I'm over at the 4 UV.

CAPCOM Okay, reset and then target is 134 azimuth and 39 elevation.

DUKE Okay. Okay Houston 321 mark reset and 134 azimuth. Houston can I get the reset again. I didn't see the film move. No it did.

CAPCOM Okay fine.

DUKE Standby. Yep, it's reloading. Boy --

CAPCOM Okay, that azimuth was 134.

DUKE 134 is looking at the lunar module Houston. You don't want to do that.

CAPCOM Okay, would elevation of 39 look over?

DUKE Heck no. It's at 26 now and it's not clearing Well, let me see, it might. Okay Houston I just got a water flag. If you want to take a look at Charlie, yeah it'll clear it, but it's not any good Houston.

CAPCOM Okay Charlie, what do you have?

YOUNG He has a water flag.

CAPCOM Okay, azimuth is 258, elevation is 64.

YOUNG Okay, I'm going to go to reset again, will that be alright?

CAPCOM That's fine.

YOUNG I can't make it. Okay, reset mark, 258 64.

CAPCOM Rog.

DUKE Man that is some contraption John. 258 and 64 Houston.

CAPCOM Okay, fine. We'd like for you to get on in then.

DUKE Okay, That's not looking at anything that I recognize.

YOUNG Okay Charlie here I come. Keep cool man.

DUKE I'm fine. Don't worry.

YOUNG Boy up to the 3rd ring Charlie.

DUKE Beautiful, just like flying.

YOUNG Bet the Lakers will want you when you get back.

DUKE Feel those bags.

YOUNG Okay fine I've got them. Thank you. No I thought I had them.

YOUNG (garble) a little bit.

DUKE I'm not closing you out John, I just -- let me get some bending room here.

YOUNG Okay Charlie.

DUKE Okay.
YOUNG SECB. Okay, I'd get that hook out of the way if I were you.
DUKE Okay, hook is out of the way. See anything that will do that. I think you can get it -- wait a minute, I can get it here. Okay, I got it.
YOUNG Okay. Get Charlie out of the humble abode.
DUKE Okay, you really got to arch your back, John. There you go, you got it. Hey, come towards me a little bit. Keep coming towards me. There you go. Okay, bend over a little bit. Come forward a little bit. There you go, you got it. Your tool harness is hooking up on your -- there you go.
YOUNG Oooh Man. Okay, now we're back inside. I cannot turn around Charlie.
DUKE (garble) if you go the other way. Okay, you got it.
YOUNG We got to move something.
DUKE Yeah, you -- you're sitting on the hatch.
YOUNG Oh.
DUKE Don't want to close it all the way and get all this feed water in here. Okay, now come around. There you go. Now we got it -- we're back inside. Okay, we got to close the primary H2O.
YOUNG Okay.
DUKE If you'll turn -- there you go.
YOUNG Get yours closed.
DUKE Your's is closed?
YOUNG Okay, let me get yours. Get my visor up.
Okay. You swing your pack this way just a little.
DUKE How's that?
YOUNG Okay, your water valve is closed.
DUKE Okay. Now we can close the hatch. Okay, dump valve going AUTO.
YOUNG I haven't got the hatch closed Charlie.
Okay. Now it's closed.
DUKE Okay, can you lock it?
YOUNG No.
DUKE Probably got to push it to lock it. There you go.
YOUNG Dammit. Can't lock it. Why don't we wait till we get it pressurized. It's closed good and tight.
DUKE Okay.
YOUNG Got the dump valves to AUTO?
DUKE No not yet. I was waiting till you get out of the way. Okay, Okay dump valves in AUTO. Okay, press those 2 and the press flags may come on during repress. Okay, I'm going cabin repress AUTO, CB 16, cabin repress closed.

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YOUNG

Okay.

DUKE

Move up just slightly. Let me take the rest.

YOUNG

Okay.

END OF TAPE

DUKE Cabin Repress.
YOUNG Here we come.
DUKE I got an 0 flag.
YOUNG I got an 0 flag.
DUKE How is the pressure?
YOUNG Two psi, Charlie.
DUKE Two?
YOUNG Two.
DUKE Three?
YOUNG Two.
DUKE Oh, Okay.
YOUNG Okay, read the checklist. Something
happened you might want to add.
DUKE Where is it?
DUKE (Garble)
YOUNG Maybe we can turn the PLSS O2 Off.
DUKE Okay, PLSS O2 Off and Cabin Pressure
Off. Man, is it up there already? That is amazing. Hey,
Houston, will you turn off our PLSS O2 (garble)?
CAPCOM Okay, very good. You had a 7 hour and
11 minute EVA.
DUKE Super. Master alarm its cabin, probably.
Okay, PLSS O2 press reg and master cabin lights are On,
verify cabin pressure. Go to press reg. and B to cabin.
YOUNG Go to press reg and B to cabin, Charlie.
DUKE Okay, got 'em.
YOUNG Okay, cabin warning light off?
DUKE It is.
YOUNG Okay. Verify cabin pressure stable
at 465. Pressure valve to press pg as required.
DUKE Hey, mine's pressed.
YOUNG Mine seems like it's depressed, too.
YOUNG Verify EVA circuitry configurations.
DUKE Okay.
YOUNG White stop's out plus EVA (garble) plus
the other contingencies (garble) that we're using today.
DUKE Say, Houston, do you have telemetry?
CAPCOM Rog. We have telemetry.
DUKE How does the cabin ECS look to you?
YOUNG Wow, look at all them footprints out
there, Charlie.
DUKE Great.
CAPCOM John, verify you locked the forward
hatch.
YOUNG No, I didn't lock it. I will.
YOUNG That got it. Now it's locked, Houston.
CAPCOM Okay.

YOUNG Let's push that (garble) in. That's hard to do, pressurized. I think it's impossible.

YOUNG I'm so dirty, I can't believe it. Okay, let's keep going here, Charlie.

DUKE Doff gloves, stow in panel; doff helmets with visors, lower shades, stow in -

CAPCOM And, Charlie, your cabin ECS looked good.

YOUNG I'm going to have to have some air in here (garble).

YOUNG Can you help me?

DUKE Yes.

YOUNG I think I have some pressure in my suit.

DUKE Yes.

YOUNG I think my fingers are just tired.

YOUNG What a mess, Charlie.

DUKE (Garble)

YOUNG Right.

PAO This is Apollo Control at 126 hours 21 minutes, and we've just had a report - a further report on Ken Mattingly and Casper. Everything continues to go very well. Flight Director Donald Puddy, who is following the actions of the Command and Service Module, said that they have not missed a thing in the Flight Plan. Everything is going very well. At the moment, Mattingly is taking UV photographs of the landing site, Casper passing almost directly over the Descartes site now.

YOUNG I am tired, too. I tell you.

DUKE Okay.

YOUNG Okay. Again, it says doff helmet and visors, lower shades, stow in helmet bag.

DUKE (Garble)

YOUNG Hey, that Moon dust don't taste half bad.

DUKE Is that what it is?

YOUNG Yeah. I think it is just the ECS.

YOUNG Okay. One helmet bag. Verify safety on dump valve. Get that?

YOUNG First thing I want is a drink of water.

YOUNG I'm going to take a break and get me a drink of water.

DUKE I finished mine long ago.

DUKE (Garble)

YOUNG (Garble)

YOUNG Yes.

DUKE I could have drank all of mine if I had a mouth behind my left ear. That's my only problem. It got lodged back there and I could never get at it.

DUKE (Garble) You should have seen the water quantity go down about 10% on that drink.

CAPCOM Okay. We saw it, Charlie.

DUKE Boy, that tasted good. Okay, verify safety. Descent H2O valve open. Remove purge valves, stow in purse.

YOUNG Okay, disconnect Op on, this O2 hose.

YOUNG That's why you saw me dogging it out there.

DUKE Okay, I am turning my pump Off.

YOUNG (Garble) I've got to disconnect your Op Purge valves -

YOUNG Do I still have purge (garble)

DUKE Yeah, where they connect her.

YOUNG Try not to step on that bag. That one's going back to the Command.

DUKE Okay.

YOUNG I can't believe I am so dirty.

YOUNG It works good, once you get around to it.

END OF TAPE

YOUNG Now, it works good, when you can ever get around to it. Well, shoot, Charlie, let me get this thing.

YOUNG Charlie, it's dusty here.

DUKE Okay, let me give you a -- why don't you turn face me.

YOUNG (garble) turn around. It's hard to get mine -- have you got yours?

DUKE You know, it would be a lot easier if you could come this way. Oh shoot, ah--oh.

YOUNG Alright, how's that? (garble)

DUKE Okay.

YOUNG Okay Houston, now read your checklist. Disconnect OPS 02 hose, connect LM hoses, -- funny that we have to do that -- suit (garble) on both suits close, plus pump off and fan off.

CAPCOM Okay.

YOUNG Disconnect (garble) H2O from PGA connect LM H2O -- now that's the best thing we got to do. Okay, I got a (garble) plus (garble).

DUKE (garble)

DUKE Okay, give me a (garble) pen, okay, there it is.

YOUNG Where's yours at?

DUKE I think it is on the wall here.

YOUNG Come on up this way with it.

PAO This is Apollo Control at 126 hours 28 minutes. Young and Duke will spend about an hour and a half to two hours getting the LM cabin cleaned up, stowed, and getting their suits off. We'll then debrief them on the EVA, and let them get something to eat, they'll recharge the portable life support system, and we're scheduled to begin an 8 hour rest period for the Lunar Module crew at ground elapsed time of 130 hours. We'd like to update the status in regard to the possibility of a third period of extra vehicular activity. There will be a meeting tonight, of project and management officials to plan details of the second EVA, and to discuss options for a third EVA. Among the topics that will be considered will be the status of Lunar Module consumables -- such things as water and electrical power, battery reserves, the status of the network -- in particular what manned spaceflight network stations will be available for liftoff and rendezvous at the various times. Also the effect of various lunar stay durations on liftoff times and return trajectories. Also, of importance will be the -- what the options would mean in terms of crew workload. A final decision on whether or not to go ahead with a third EVA may not be made until after the second EVA when we will evaluate the accomplishments of the first two EVAs and

PAO also the condition of the crew. And a final decision as far as the third EVA may not be made until after the crew rest period following the second EVA when we'll have an opportunity to make a final determination as to the crew condition and their ability to carry out a third EVA, and then to continue on through the lunar liftoff rendezvous and docking sequence.

YOUNG Yeah, well I hope.

PAO At the present time Young and Duke are going through their checklist getting the lunar module in the proper post EVA configuration.

DUKE Okay, now can you spin around there.

YOUNG Yeah, here comes all the check with the cards.

DUKE Oh good.

YOUNG Don't need that one, it must be a NAV card. Okay.

DUKE (garble) up.

YOUNG Which way, Charlie?

DUKE Well, your hoses are coming from this side, so you got to get to that valve behind you. There you go.

YOUNG That's the valve I got to get to that's behind me, Charlie. Ha ha.

DUKE Okay plus (garble).

DUKE Houston, how do you read, over?

YOUNG Turn sideways Charlie, let me get you some oxygen.

DUKE We are still in down voice backup, we should be hot mike.

DUKE Houston, how do you read, over?

CAPCOM Orion, this is Houston you're hot mike to us.

DUKE Okay, reading you 5 by -- how else?

CAPCOM Loud and clear.

DUKE Okay, we're still in (garble)

CAPCOM Roger, John, we're following you through the checklist.

YOUNG Charlie - (laughter)

DUKE They think I'm you!

YOUNG Okay, that does it.

YOUNG Okay now. I don't have a watch -- here wait a minute, yeah, I do too. Okay, go ahead I'll start a mark -- I can't make it. Wait a minue Charlie, don't move.

Twist (garble) going to (garble) --

DUKE Oh, listen to that oxygen run in there.

YOUNG You got it open?

DUKE Yeah, can't you tell?

YOUNG No.

DUKE You don't hear nothing?

YOUNG No.

DUKE Poor fellow you better get your ears checked.
 YOUNG You sure that's open?
 DUKE Yeah.
 YOUNG You just about ran out of oxygen too, while
 you were at it, didn't you?
 DUKE Hey Houston, can you give us the mark at
 the end of 4 minutes.
 CAPCOM Roger, starting now.
 YOUNG You're already at it now. Okay.
 DUKE That Ed Mitchell?
 YOUNG Yep.
 DUKE That you Ed?
 CAPCOM That's affirm.
 PAO Our spacecraft communicator for the Lunar
 Module at the present time is astronaut Ed Mitchell. He has
 relieved astronaut Tony England in that function.
 CAPCOM Did a fine job.
 DUKE That's good. It's a lot of fun I'll tell
 you that, my gosh if it isn't
 CAPCOM You bet your life!
 CAPCOM Just take her easy there and catch your
 breath, and I'll let you know when 4 minutes is up.
 YOUNG That's what we're doing.
 CAPCOM Suprisingly enough, John, we have better
 com now than before you went out on the LM.
 DUKE I don't understand that. They must have a
 big dish still up.
 DUKE Hey Ed, this is really a spectacular place.
 Now I know why you were so excited at Fra Mauro.
 CAPCOM Roger, roger, Charlie -- and the com is
 better because we have the 210 up now.
 DUKE Yeah. How long are we going to have that
 beauty?
 CAPCOM We'll only have it for a few hours here,
 but we're hoping to have it for a good portion of the other
 EVAs, but I don't have the exact numbers yet.
 DUKE Thanks Ed.
 YOUNG Ed, you're right, it was almost beautiful.
 CAPCOM Pretty close to the margin there, John.
 YOUNG We only -- yeah, we only had 110 percent
 this time.
 CAPCOM You're right.

END OF TAPE

DUKE Yeah, we only had a 110 percent this time.
CAPCOM You're right, and delay my last I don't guess we'll have that large antenna.
DUKE That's okay.
CAPCOM There was the comm during the EVA was magnificent.
YOUNG I guess for you - guys it was good uh.
CAPCOM Yeah, really great.
DUKE Uh, Ed this a - you - you guys have been loud and clear to us every time on your uplink regardless of the dish.
YOUNG That's right.
DUKE Sorry we're so bad to you.
CAPCOM Okay, we've got about 50 seconds to go here on PLSS field.
DUKE Okay.
YOUNG Pass some water to me, Charley.
DUKE Okay, how about a little squirt.
YOUNG Man, this LPG pump cooling. It's the best thing they ever built.
CAPCOM Yes, that's pretty great, isn't it.
YOUNG That's enough.
DUKE Yeah - Yeah, John says sock some water to me and I just get the breaker and he says that's enough everytime. Man it really (garble) you. You can't take it any long length of time, you just have to turn it on to get your suit all cooled down in about 10 seconds and shut it back off again.
CAPCOM Your right. Hey, mark 4 minutes. You can go to the next one.
DUKE Okay.
YOUNG Okay, fifth built, coming off.
DUKE You want me to reach that John?
YOUNG Yeah, can you give (garble) Charley.
DUKE Yeah. That's a hard valve isn't it. Okay, it's closed right from where I'm at.
YOUNG Closed and clockwise, isn't it?
DUKE Yeah. Okay, let me get you off, up this thing. Now it'll hold.
YOUNG Can you get up (garble) All right. I'm going up to move that TV and come on.
DUKE Alright.
YOUNG Keep that hose out of the drag.
CAPCOM And we'll take your reading when you get to it there, John.
YOUNG Okay.
YOUNG What you got Charley?
DUKE I don't know. Is this thing turning up. Turn

DUKE to look.
 YOUNG I don't think it did - - yeah, AR. 95 percent.
 DUKE 95 percent.
 YOUNG Yeah,
 CAPCOM Okay. Copy 95 there.
 DUKE Hey, Houston I have 90 - - yeah, ain't it amazing.
 CAPCOM That sounds like a good fill.
 YOUNG 4 minutes.
 DUKE What's that.
 YOUNG Let me have that dag gum - -did you get mine.
 DUKE Where are we in the checklist?
 YOUNG We'er PLSS 02 PLSS fill.
 DUKE Okay. Okay, Yeah. All you need to do is pick that thing in my (garble) there. Let me stand here for 4 minutes.
 YOUNG You can do that uh.
 DUKE Yeah. Give me a little water down for a little water drum filter.
 YOUNG Okay, wait a minute.
 DUKE Okay, you'll have to move up, John, a little bit if you can. Can you?
 YOUNG Up where?
 DUKE Okay, Ed on my mark. Mark. It's open.
 CAPCOM Roger.
 DUKE Here you go. John.
 YOUNG Okay, right here.
 DUKE I can't believe it.
 YOUNG And I put that beauty dry.
 CAPCOM Say, Orion. We figure this 8 minutes of refill is enough rest. We'll start EVA 2 immediately.
 DUKE You better send a couple of more guys up here. You'll have to try (garble) it takes 5 minutes.
 YOUNG Yeah - I really think I could take another couple hours except for my fingers.
 DUKE Yeah, I kind of think so too. I can do the running around, that would be a piece of cake.
 CAPCOM Yeah. They start to get bloody stumps after while, don't they Charley.
 DUKE That's exactly what they feel like Ed. But it's worth the bloody stub or two I'll tell you that. Was really an experience.
 DUKE Yeah, my suspision was confirmed on the rock. Some rocks had dust all over them and some didn't have any. It still don't, and still do.
 CAPCOM Sounds familiar.
 DUKE Boy, I tell you these little EMU's PLSS's

DUKE are really super fantastic.
CAPCOM Yeah, they do a pretty fine job.
DUKE Next time you get a chance with a camera
look and see where we landed just beyond.
CAPCOM Okay.
DUKE Dave, you won't believe the size of that
hole back there. You just won't believe the size of that hole
behind the LM.
CAPCOM Charley I believe anything.
Im gullable.
DUKE How's our time, Ed?
CAPCOM Got about 50 seconds.
DUKE Thank you.
DUKE I'll hog all the water.
YOUNG Houston, when we do a water recharge, if we
set the PLSS's on the floor or on the midstep. It thing level
enough so we won't have a tilted PLSS as long as the PLSS is
vertical. Or - Or is (garble) in my station?
CAPCOM Stand by on it John, we think so. We'll
have a good answer in a moment. And your 4 minutes is up
you can press on. Give us a readout.
YOUNG Okay. Time that. Let me turn that little beedy
off.
YOUNG I just can't reach it.
DUIE Okay, it's off.

END OF TAPE

DUKE (garble) just can't reach it.
 YOUNG Okay, it's off. Now at E4.5 percent.
 Houston, 94 and a half.
 CAPCOM John, say again your number.
 YOUNG 94.5
 CAPCOM Roger, 94.5 and John setting it on the floor
 will be fine if the hose is long enough so it doesn't tilt.
 YOUNG Okay. We mainly on the midstep is where we
 are thinking about doing it.
 CAPCOM That's really the best place.
 YOUNG Can you stow the supply hose which (garble)
 DUKE You can't move.
 YOUNG Naw, it's the wrong way. I want it -- we
 wanted to stow this thing but I guess we could leave that out.
 DUKE What's that.
 YOUNG That's that supply hose.
 DUKE Oh I'll do it.
 YOUNG Okay. Charlie, all you got -- had to do is
 ask. I'll admit I ain't paying any attention but you might as
 well ask anyhow. Man, that's really something else. Okay dis-
 connect OPS actuator from RCU, disconnect RCU from PGA.
 DUKE There you go. That thing right there.
 Wait a minute John, before I do this I got a wet rag over here.
 I'm going to wipe that RCU off before I put it anywhere.
 YOUNG That's a good idea. Heck I'd like to wipe
 off the front of your suit in a couple of places. The only place
 you haven't got dirt is on your neck ring.
 DUKE Sorry I gave out of water there, we'd have
 gone another hour. Man --
 YOUNG You were really huffin and puffin on that
 drill.
 DUKE Yeah, when I was really huffing is when I
 went over and got that rock and fell down. That's how I got
 so dirty.
 YOUNG Oh.
 DUKE Because I had the camera on and I couldn't
 get close enough to spring up so I backed into a crater. (garble)
 YOUNG Ah.
 DUKE Hey that's going to work neat John. We can
 wipe that out on PGA's with something like that. Okay, disconnect
 RCU, that's this thing and PGA.
 YOUNG Okay, there's mine, here. Okay.
 DUKE Okay wait a minute, let me read off.
 YOUNG Verified main off, pump off.
 DUKE yeah, everything off, mostly (garble) and
 then disconnect from this PLSS.
 YOUNG Okay. (garble) Okay, that's yours Charlie.
 Yours goes in first.
 DUKE Let me get my (garble) connected.

YOUNG Okay, babe. Okay, that's one. It occurs to me when we suit up tomorrow, we're going to have to wash our hands before we can put our gloves on or we get alot of dirt in the suit loop.

DUKE Yeah, I agree.

YOUNG Well that's got it -- it ain't going anywhere. Okay, disconnect PLSS O2 hoses, stock O PLSS -- O PLSS and OPS, mine first. Stow main PLSS on floor and yours on the mid-step.

DUKE Okay. How'd I get so dirty.

YOUNG Let me get some of this off down here Charlie.

DUKE Okay.

YOUNG Set around here. Okay.

DUKE Let me have this, I want to get that - this connector clean right here.

YOUNG Dad gummit, I knew I was going to do something I'd forget again. I was going to cut my finger nails. Look at those things.

DUKE Yeah, mine are the same way and I cut mine. I don't think it has anything to do with that. Okay, you're free and I'm free. Let me dock mine first and I'll put mine in.

YOUNG Okay. Got it Charlie.

DUKE Okay, hold onto it.

YOUNG Got it.

DUKE Okay, I got it.

YOUNG You got one side of it, I got the other side.

DUKE Okay, let it go, I got it.

YOUNG You're hung up on something.

DUKE Your hoses I think. Either that or my hoses. Yeah, my hoses. Ahh -- okay, OPS is reading 6,000. Yeah, that's right, that's where it started.

YOUNG Now Charlie. Don't cut yourself on the -- okay now that (garble) I couldn't put it in here.

DUKE Okay.

YOUNG Okay, report OPS pressure.

DUKE Okay, let's get your PLSS off and then I'll stow.

DUKE Let me -- let me stow this stuff, okay.

YOUNG Okay. That's a good idea.

DUKE Okay, now I want to stick that beauty right up under there for now. Okay, now we're ready to get yours off. Yours goes to the midstep. Can you pick up on it?

YOUNG Oh yeah. Okay. Got it.

DUKE Okay, okay to the midstep with that one and look at your OPS pressure.

YOUNG Yeah. (garble) bucket of worms in it. What the bucket of worms is, is old dumb dumb here is turning the wrong direction.

DUKE Okay Ed, Johns OPS is 5900 and mine is --
about 6,050.
CAPCOM Okay copy that Charlie.
DUKE We've got the PLSS docked now. We're stowing
the OPS hoses.
CAPCOM Roger.
SPEAKER Okay, there we go. (garble)
Stow LM O2.
DUKE Install gas connector plugs in first.

END OF TAPE

DUKE There we go. (garble) LM 02.
DUKE (garble) connector plugs in first, and
electrical dust cap.
YOUNG Better do something about that, Charlie.
DUKE What.
DUKE About what, John?
YOUNG Where'd the electrical dust cap go?
DUKE I don't know. We can get a piece of
tape and put over it.
YOUNG Yeah.
YOUNG What is the electrical dust cap.
DUKE Oh, that's these things RCU covers.
YOUNG Okay. Done.
YOUNG Done.
DUKE Your PLSS LiOH cartridge debaters number
1 and 2 are placed with 3 and 4. Okay, change PLSS pack (garble)
stow in (garble) PLSS bag. Put a cable to battery so PLSS straps
holds it in strap. Okay?
YOUNG Okay.
YOUNG Where are the PLSS straps
DUKE Up here. You got number one?
YOUNG Yeah.
DUKE You need to get number three?
YOUNG Okay, there's number one and it's being
replaced by number 3.
DUKE Old number one, it's hot too, Boy.
YOUNG Put this cover on it, so we can make sure
it's been used.
DUKE Okay.
YOUNG Well that ain't really too good of a clue,
is it.
PAO This is Apollo Control at 126 hours,
58 minutes. We're in the process of handing over our shift
here is Mission Control, Flight Director Jerry Griffin
coming on to replace, Flight Director Pete Frank. And the
spacecraft communicator at the present time is Astronaut
Ed Mitchell. We're estimating that the change of shift
briefing will occur at about 8:00 or perhaps a little bit
later.
YOUNG KS connected, can we connect your hoses?
All of them?
DUKE (laughter) (garble) let me see that
diagram one more time. Boy is this one - -
YOUNG Thank goodness for those covers.
DUKE You didn't get it, John.
YOUNG (garble) --
DUKE You can go on all the way in, and so it
pops out on you.
YOUNG (garble)
YOUNG 1, 2 (garble) Just like the water
DUKE Yeah, water.
DUKE Okay, that's got it. 3 is electrical.
YOUNG Electrical?
DUKE It's this one.

YOUNG (chuckle) (garble) 3. What really is
 SPEAKER (garble)
 DUKE You're right, it keeps popping out.
 DUKE Thank you John. 3 and 4 is this and
 this should have been one.
 YOUNG (laughter) Okay. Can you disconnect
 left end of PLSS tube corners? Change LiOH cartridge
 temp less than 130. Read cartridge decal, stow used LiOH
 cartridge inside cannister, stow cannister's in buddy's PLSS
 bag install PLSS tube corners. Okay?
 DUKE Okay.
 YOUNG No shut on switch, Charlie.
 DUKE All but, coming up.
 YOUNG Now, how do you take this thing down?
 DUKE Well, let's undo the bottom and just
 slide it up, how's that?
 YOUNG Okay.
 DUKE The bottom's all ready lose.
 YOUNG That's got it.
 DUKE Okay, I'll get you a cannister.
 YOUNG Okay.
 DUKE If I can reach it.
 DUKE It would have to be number 1. I believe
 it was in a vacuum.
 YOUNG Okay, Charlie. That's got me.
 DUKE You just got one, Okay. That's the
 wrong one.
 YOUNG Now, wait a minute. Yeah, this is one.
 DUKE That you got out all ready?
 YOUNG Yeah.
 DUKE Okay.
 YOUNG Shoo, oh man!
 DUKE Dadgum it.
 YOUNG Man, I'd thought I'd had it out there
 with that LCRU, I couldn't get that astromate connector done.
 The thing, the cable's too stiff, I'd push down on it
 and the cable would push me back.
 DUKE (laughter)(garble) for some reason.
 Never had any problem with that.
 YOUNG Yeah, me either. (laughter) been
 anything like that, that connector never had, had problems
 before.
 DUKE You know, that's the kind of thing you want
 to push on just as hard as you need to do to get it but
 you don't want to push on it hard enough to boogie it.
 YOUNG I know it.
 DUKE The question is how hard is that?
 What's it's (garble)
 YOUNG I don't know.
 DUKE Well you can put a lot -- that old
 jack John, just brought that core stem right out of there.
 YOUNG Wish we could have had that -
 DUKE Okay. That's got it. In and locked.
 YOUNG Okay. Now we got to reinstall the tool
 harness.
 DUKE Okay.

YOUNG Well, I don't know - I never even saw that thing till all of a sudden I turned around and it was following me.

DUKE Pull this down, John?

YOUNG Okay, now wait a minute, now slide it under here. Tell you what let me undo it a little bit.

DUKE Okay. (garble) slip under.

DUKE (GARBLE) Mine wasn't on this side. Okay, now tighten it up for you

YOUNG Okay. Whoa, whoa, Charlie' I'll never stow it now. You got to let it --

DUKE Okay.

YOUNG Stand over this beam.

DUKE No need to get it too tight, we've got to get in here anyway.

YOUNG That's right we've got to refill --

DUKE Refill.

DUKE Okay. Boy you'd think that the lunar dust would smell so funny. You think?

YOUNG No. No, I don't know what it is.

DUKE Okay, disconnect OPS antennas to remove OPS to stow antenna lead.

YOUNG Okay.

DUKE Stow commander's OPS on engine covers. Stow commander's PLSS in restorage space.

END OF TAPE

YOUNG No, no I don't know what it is.
DUKE Okay, disconnect OPS antennas, remove OPS
and stow antenna leads.
YOUNG Okay.
DUKE Stow commanders OPS on engine covers,
Stow commander PLSS and restart station.
YOUNG I will have to hook that back up
because we're going to do a checkout again tomorrow and hook
it into here.
DUKE Yes. That's right.
YOUNG Well, I hate to tell you this, but it won't -
it's just not long enough.
DUKE Well, I'll get another hose. Okay, wait
a minute. Okay, that should do it. Reach?
YOUNG Yes.
DUKE Is it long?
YOUNG It's long.
DUKE Okay PLSS.
DUKE Okay, now comes our major chore. Getting
that beauty into that.
YOUNG Let me show you something, how easy it is
in 1/6 gravity. Well, lend me your flashlight.
DUKE It's in the purse.
YOUNG In the purse?
DUKE You looked beautiful standing there by
Fflag Crater but you are ugly now.
DUKE Ah, the panoramic scene of beauty. We might
have too much junk sticking out there, John.
YOUNG That ain't the problem. Okay.
DUKE Do you want me to slide around on this side
and help?
YOUNG I need that flashlight again, Charlie.
DUKE What did you do with it? Put it back in here.
YOUNG Okay.
DUKE Let me help.
YOUNG Okay.
DUKE Well, one reason, this thing wasn't in over
here, okay?
YOUNG Okay. Now.
CAPCOM ORION, Houston, when you get a moment, give
us normal voice.
YOUNG Okay. Charlie, it's not making it.
DUKE I know it's not making it, you got too much -
the hoses are sticking out too far. This side - I could get
this side right now.
YOUNG Okay.

YOUNG Yes, I've almost got it over here. Great,
can you raise up on it a hair?
DUKE Yes, this way?
YOUNG No the other way.
DUKE There you go.
YOUNG Now, push toward the wall.
DUKE Okay.
YOUNG There you go, push toward the wall.
DUKE Okay.
YOUNG Now, screw it in.
DUKE Okay.
YOUNG Wait a minute, give me the flashlight now.
DUKE Okay, down a little bit.
YOUNG Okay.
YOUNG There we go.
DUKE You got it.
YOUNG Yes.
DUKE Ahhhhh.
DUKE Houston, that was accomplished in only -
it only took us 10 minutes to stow the PLSS.
CAPCOM Well, that's about 2 minutes better than
usual.
DUKE Oh.
YOUNG Okay, Okay, commanders PLSS L in place -
L in PLSS could have missed out.
CAPCOM Sure. We'd like that normal voice when
you get a second.
YOUNG Let me stow the hose.
DUKE Houston, how do you read us on normal voice?
Over.
CAPCOM Okay, reading you loud and clear on normal
voice. Then also check panel 16 comm display circuit breaker
closed. Verify that for us please.
DUKE No sir, it was open.
CAPCOM Okay, it's open, please close it.
DUKE It's closed now, Ed.
CAPCOM Okay, Charlie, thank you. Okay, give us
high bit rate now, Charlie.
DUKE Okay, you got high bit rate.
CAPCOM Okay, Charlie, since you are off of hot
mike, now when you get to the battery management portion coming
up next on your checklist, skip it and we'll pick it up at 128
hours.
DUKE What time is the GET now, Ed?
CAPCOM Okay, your GET now is 127:13.
DUKE Okay.
CAPCOM Okay, we'll be changing the procedures
slightly, Charlie so let us know - we'll call you when its

CAPCOM time to do that battery management.
DUKE That's fine, we don't have any tic-toc,
so if you'll just call us, we'll appreciate it.
CAPCOM Okay, and let me advise you of something
that's coming up. Before you get your PGA's doffed and over
the engine cover, we want to stow that extra LiOH canister back
in the bracket there.
DUKE Okay, yes, we'll get that.
CAPCOM And ORION, Houston, we're showing your
suits disconnect valves in disconnect.
DUKE That's affirm, we don't have the hoses
hooked up. I'll hook up the hoses and turn on the air.
CAPCOM Good enough, thank you, Charlie.
DUKE Ed, we're in - here's our configuration,
cabin gas return is open, suit circuit release to auto, suit
gas diverter push cabin to suit isolate valves and suit flow,
and the hoses are hooked up to the wall.
CAPCOM Okay, Charlie, fine.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 18:57 GET 127:14 MC-485/1

DUKE Kid, we're on the Lunar Surface Check-
list, Page 3-4. Over.

CAPCOM Okay, Charlie, we copy that.

END OF TAPE

YOUNG Okay Houston, bag number 5 is in sample -- SCB number 5 is in sample containment bag number 5 and it weighs 14 pounds.

CAPCOM Okay we copy that. SCB 5 in bag 5 and it weighs 14 pounds.

YOUNG Bet you at least 10 pounds must be the SCB.

CAPCOM You collected alot of rocks out there.

DUKE That was only one rock and that was a grab sample that I got about 30 meters in front of the LM. Over.

CAPCOM Right, that's right.

DUKE Okay SRC number 1 weighs 42 pounds.

CAPCOM Okay we copy.

DUKE And that's all the rocks we got.

CAPCOM Okay. Okay, I don't know how factual it is, but I remember getting a note the last week before launch that you had your rock control weight up to 215 pounds.

YOUNG Okay Tony we'll get 215 pounds of rock.

CAPCOM I bet you will.

YOUNG How much have we got now?

CAPCOM Oh you have 56 pounds you called back including the weight of the SRC, which is about 12 pounds, so that would make it about 44 pounds. I bet the mulley specials down there will double your weight.

YOUNG I'm sure it will, it gave Charlie a hernia.

CAPCOM Okay, and that SCB 5 we'd just like you to stow behind the engine cover, if you can still get to it behind the suits there. We can't give you a permanent location because we don't have the CG yet, without the rest of the rocks.

YOUNG Understand. It doesn't make much difference right now.

CAPCOM Okay. Hey I thought you might be interested up there, all the orbital science is working fine. The only problem Ken's had is with the laser altimeter. It only keys about 80 percent of the time, so he's losing about 20 percent of the data but that's still working fine and everything else is outstanding.

YOUNG Yeah, well what's (garble) his data show is -- what's he say Descartes is made out of?

CAPCOM Okay thats a

YOUNG Does he get that in real time like he did last time?

CAPCOM I'll get back there and find out. I'll get back up to you with that.

YOUNG I was just curious as to what the sensors were saying about our area right here.

CAPCOM Yeah, I'd like to know that too.

DUKE Houston 16.

CAPCOM Go ahead Charlie.

APOLLO 16 MISSION COMMENTARY 4-21-72 GET 127:24 CST 19:07 MC-486/2

DUKE Okay we just picked up a pretty high pitched hum in the -- in the ECS loop. Would you have them take a look.

CAPCOM Okay, we'll do that. Okay ORION we have high bit rate and we don't see anything out of the ordinary right now.

DUKE Okay. Thank you.

CAPCOM Incidentally, whenever you happen to get your data book there, I have some new block data for you.

DUKE That'll be awhile Tony.

CAPCOM Okay no hurry.

END OF TAPE

DUKE Okay, Tony. John's taking his PTA off.

CAPCOM Okay.

DUKE In fact Tony, I think this high pitch comm
is how the loop should sound if I remembered our chamber test.
This is exactly what it sounds like and it hadn't been doing
that.

CAPCOM Okay. Very good. Are you trying to tell
us you don't know what normal sounds like.

END OF TAPE

PAO This is Apollo Control 127 hours 55 minutes ground elapsed time. While Duke and Young are preparing for their post EVA debriefing, and getting all the housekeeping chores done aboard Orion, Ken Mattingly, in lunar orbit, has been giving a description of some of the sight seeing he has been doing aboard the Command Module. Why don't we listen in on that conversation?

MATTINGLY ... and stuff is running out of it - dark material. And, maybe I'm all out to lunch on that, but it sure looks that way. And I got some pictures of that. That whole area to the north and west of King has really got a lot of stuff in it that I'd never seen before, and I suspect that's because King has been so interesting that we hadn't looked at the pictures around it. And I've remarked several times about the swirls and things that I see back there in -

END OF TAPE

MATTINGLY Maybe I'm all out to lunch on that, but it sure looks that way. And I got some pictures of that. That whole area to the north and west of King has really got a lot of stuff in it that I've never seen before. And I suspect that's because King's been so interesting we hadn't looked at the pictures around it. And, I've remarked several times about the swirls and things that I see back there, in that I thought they had topographic relief yesterday. Today I really can't tell whether they do or not, and I think that's due to the changing sun angles. And, (garble) Farouk made some comment about that being near Abbawaupha. And I'm really talking about an area that's north of Abbawaupha by about 5 degrees. It's about - If you draw a line between Piersoff and King, (garble) is about as far south of that line as the area I'm talking about is north of it.

CAPCOM Okay.

PAO This is Apollo Control. To repeat an earlier announcement, the Change of Shift Press Briefing with the Orange Team will take place no earlier than 8:00 PM and it will be in the main auditorium - repeat, main auditorium - rather than the small briefing room. Duke and Young have begun to talk a little bit now aboard Orion. Let's switch back now to Air-to-Ground 1.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 20:00 GET 128:17 MC-490/1

YOUNG Okay, Houston. We're ready for the EVA debriefing with Houston and lift-off time - I guess we can take that, too - if we can find the Data Book.

CAPCOM Okay, fine. Why don't we just give you all the housekeeping right now?

CAPCOM Charlie, when you're ready, we can give you battery management.

DUKE Okay, go ahead with that. Charlie's all ears.

CAPCOM Okay. If you'll read us the ED voltages.

DUKE It's amazing, but there's still 37 volts.

CAPCOM Well, that's encouraging. Okay, we'd like the lunar battery to the CDR's bus. Battery 3 and 4 Off. Batteries 1 and 2 On.

DUKE Okay. I won't do it in that sequence, but I'll do - I know what you want.

CAPCOM Okay. Fine. Okay, the battery management on 3-3 will get you there.

PAO This is Apollo Control. The Change of Shift Briefing should start at any moment in the main auditorium. Any air-to-ground from the Lunar Module will be tras - will be taped for later playback at the conclusion of the change-of-shift press conference. At 128:25, this is Apollo Control.

CAPCOM And, do you want this block data?

END OF TAPE

PAO This is Apollo Control 129 hours 19 minutes ground elapsed time. Command module CASPER is some 24 minutes away from acquisition on the beginning of the 29th lunar orbit. During the past two press conferences, quite a bit of tape has stacked up from the lunar module ORION. The post-EVA debriefing and we'll play back that tape and pick up live as any future conversation resumes.

ORION Ready to copy.

CAPCOM Okay, it LM liftoff from timeline (garble). T28 128 plus 21 plus 08. T29 130 plus 19 plus 49. T30 132 plus 18 plus 22. 131 134 plus 16 plus 54. T32 136 plus 15 plus 27. T33 138 plus 15 plus 20. And that's it.

ORION Okay, give me 31 again Tony.

CAPCOM Okay, T31 134 plus 16 plus 54.

ORION Okay. Starting with T29 130 plus 19 plus 49; 132 plus 18 plus 22; 134 plus 16 plus 54; 136 plus 15 plus 27; 138 plus 15 plus 20, T33.

CAPCOM Okay, readbacks good. And we have some changes to your surface checklist. 3-5

ORION Roger. What page did you say again?

CAPCOM 3-5

ORION Roger.

CAPCOM Okay we're going back to a nominal post-EVA 1 pre-EVA 2. So on the EVA debriefing with Houston, that's at 128.20. And cancel the crossout that we've put in there. Eat period is at 128 plus 35, and go ahead and do the part at the bottom of the page that you've redlined out there, the 112 plus 10. Do that part.

ORION Okay.

CAPCOM Okay, at the top of the second column there, the PLSS 02 and H2O recharge is 129 plus 20, go ahead and do that. And the rest of the page, go ahead and do.

ORION Okay.

CAPCOM Okay, on the next page 3- - 3-6, the pre-sleep is at 129 plus 50.

ORION Okay.

CAPCOM And the rest period begins at 130 plus 15. That's the bottom line, 3rd column.

ORION Okay, 130 15. Do you want us to do the - bring up the computer? Over.

CAPCOM negative.

ORION Okay, we'll still skip that.

CAPCOM Rog. Then there will be an 8 hour sleep period and I don't have the mornings checklist yet, I'd - I'm trying to get that for you tonight so you won't have any updates in the morning. Get - we'll get your Q card too tonight.

ORION That would be kind of you, Tony.

CAPCOM Okay, now I just have some questions.
ORION That should be pretty nominal, Tony.
CAPCOM Yes, we're looking right now at our completely
nominal -
ORION Hey, let me ask you -
CAPCOM completely nominal EVA 2 and the day will
probably be 2 hours longer so you have - it's kind of a relaxed
day. We'll have some time to sit down and talk in the evening.
And we're still looking beyond there, but things look pretty
good. And your biomed looks great down here, just keep up
the orange juice and try to push on it a little bit there and
everything will be fine.
ORION Push on the orange juice and everything
will be fine???
CAPCOM Yes, push on the orange juice.
ORION Rog. I'm going to turn into a citrus
prize, is what I'm going to do.
CAPCOM Oh well, it's good for you John.
ORION Ever heard of acid stomach, Tony?
CAPCOM Well, I don't know about that. Also, since
tomorrow is pretty relaxed, we encourage you to get a lot of
sleep tonight, you've got plenty of time, no need to feel like
you've got to press in the morning.
ORION Okay, and I think I've got a PH factor going
for about 3 right now.
CAPCOM Okay.
ORION Okay.
CAPCOM We'll give you a buffer when you get down.
ORION Okay, Tony -
ORION Just don't give me any orange juice.
ORION Yes. I'd like to ask a couple questions
about consumable status, how we look for EVA 3 and what kind
of day EVA 3 would be, preliminary plans. Over.
CAPCOM Okay, we've got a whole general plan here
and I'd like to send that up to you later if that's okay.
ORION That's fine. And I'd to get some information
on what we did today, in terms of how the PLSS worked and how
metabolic rates were and how - that sort of thing.
CAPCOM Okay, understand, we'll get them to work
on that. And whenever you're ready, I can start sending up
these questions from -
ORION Let's have your debriefing.
CAPCOM right - from the back room.
ORION We're ready as we'll ever be.
CAPCOM Okay, there was one here, just - using words
that we had an overrun of questions on. When your on the
motor package, where you described all three pins are pulled,
I took that to mean that had pulled the worse color there and

CAPCOM on the two switches. Is that right?
ORION That is affirmative.
CAPCOM Okay, now on the geology.
ORION We're all ready to go.
CAPCOM Good show. Okay, when Charlie was working around the LM there, he described a black vesicular basalt underneath the engine. Was that the only basalt you saw on all of EVA 1?

ORION That's all I saw. There are some more blocks than that scattered I think around the landing area, Tony.

ORION Yes, and Tony, Charlie's idea to make this area a LM 10, the directive stop 10 is a pretty good one. There's plenty to get around here.

CAPCOM Okay, we understand. You said that this area - the rocks in this area look different from what you saw. About how far out west did that difference go?

ORION There you go. I was just at 0 phase, I just hang onto the Rover and try to see where the next hole is.

CAPCOM That's called passing the buck.

ORION Let me say Tony, that the -

ORION That's not passing the buck, Tony, there's no way you can look down there when your driving and see any - you can't even see the craters must less -

CAPCOM We understand, John.

ORION less see what kind of rock is there.

CAPCOM Okay.

ORION Well, let me give it a try Tony, I always have an opinion. The rocks around the - beyond the ALSEP, where I drive out pass Spook and Buster all had this breccia appearance to them with the primarily grayish matrix with a dark class. At Buster, though, there was some rocks that were very shocked, I think. In fact, they just crumbled in my hand, the one I picked up. So at least at Buster and Spook, the rocks appear to be different in domain than they are right here. Over.

END OF TAPE

DUKE A lot appear to be different in the main than they are right here. Over.

CAPCOM Okay, we copy that. On the rocks you saw do you feel like you sample all the representative types.

DUKE Well out there at Flag they were all so dust covered I don't know. I was really surprised when John broke that big boulder open and saw that whitish matridge with the clads. I frankly don't think that was the breccia but it was pretty friable rock anyway.

CAPCOM Okay, we copy that. You first described the Muley rock as a (garble) one and then switched to - - a correction. You first described it as Dutcher, then switched to Curson, now I wonder if you could have some further fore sights on that?

DUKE Well it was - - I say when I picked it up it was pretty dust covered. And I only had a couple of spots to - - that I could look. One area looked like a crystalline rock. There was a - - if it were a breccia than that clad is very large, a centimeter or so. If it's a crystalline rock, it - - it's a sorta of a cell fire looking like crystal. The other when I turned it over it had another one of those white specks that most of the breccia's have around here and that's why I switched. So it could be a combination Tony.

CAPCOM Okay. We copy that.

CAPCOM Okay. Can you give us in numerical order the proportion of the rock types in the LM area. We wonder if there's any correlation between rock type size, shape, angular etc.

DUKE Well, it probably really is a correlation like that. I was just looking out the window here, I see some very angular - very angular rocks that are white rocks and some - - some more grayish rocks, in other words with less white in them. There are some sorta subrounded.

CAPCOM Okay, do they (garble) white rock?

DUKE No, these are all about the same size (garble) The big whities are - - it's just - - it's not going to be that (garble). I see something sitting out there in the middle of a LM area that looks like I swear they got some pinks in them, but if they were just a - - pink with black glass in them laying across - - on the way to ALSEP site. And seemly from - - you can almost say they came from South ray if you're a bet man. And that big one - - these big one's - - those need to be predomently the size of - - of a 20 centimeter rocks and their very angular. This don't - - the white rocks are also - - their smaller. They on the order of 10 to 50 centimeters. I'm just guessing cause we'er sitting right here in the middle of this thing and sort of like can't see the forest for the trees. They seem to be a smaller rock, maybe (garble) 6 to 12 centimeters, very angular. And they're probably less than 50 percent of the rocks type. The other rocks

DUKE - - the predomnent rock in the area is just an old gray, subrounded, angular and angular rock. And I would guess that's a breccia of some type. And although the surface is gray boulders strued, you probably noticed on television. It looks exactly at the ALSEP site in here it's the same amount of boulders. I guess we put the thing in the same ray almost cause it's almost on a line from here to South ray. I guess what I'm saying is I can see what I believe to be at least three different rock types out here. The white, the pinkish and this is from the LM so I'm really not qualified to do it - - the pinkish with the black glass in it and the sub-round gray rock.

CAPCOM Okay. And we sampled all three of those?

DUKE No, we didn't do any sampling around the LM. We stationed on the ALSEP site.

CAPCOM Okay. You told me that, I understood that I just wondered if you had picked up anything that you thought was pink with some black specks anywhere.

YOUNG I think most the rocks that I was with Charley when he was picking up except for that one that we beat off over there, they'er all dust covered predomently and I didn't get a chance to look at them.

CAPCOM Okay, I understand.

DUKE (garble) I'd like to give you a what I - -

CAPCOM Go ahead Charley

DUKE Let me say something Tony here. I'd like to give you what I think - - the three major areas that we saw today. One here at the LM is a - - I'm convinced is a ray from South ray. The rock type being predomently for Mare. Over by Flag we were out of that range. We were in the Cayley and I sampled on the rim of Buster. And whatever made Buster, I don't think it was a secondary because I think the rocks we picked up there were true shock rocks. I just can't see a secondary doing that. So the rocks around there we were definitely out of the ray, it's Buster and Flag and also it's -- excuse me. It's Buster and Spook. If Flag is plum we'er again into Cayley with hardly any blocks visible. So you have a Cayley without the blocks furthest out. You have the Cayley with the blocks that I think are some of the stuff that was made from Buster on the rim and in here towards the LM we have the South ray.

CAPCOM Okay. That sounds good Charley.

YOUNG Yeah, I believe Charley. I think Charley's right about that.

CAPCOM Okay. And in your summary there you answered a hole mess of my questions here. I got to fly down the list and find one you haven't answered. Okay, how about that Albeto change in the sub-surface soil that you talked about. It seemed like, course you saw it first time at Flag and more - - probably

CAPCOM more excited about it there. Were there any difference in that - - in it's nature between there and Buster and ALSEP and LM.

DUKE Uh, no. It only - - around the LM it was just in ALSEP it was just in spots. At Buster, a correction. At Plum it seemed to be everywhere. And everywhere we dug a little scoop. My predomenent impression was that the white albedo was coarser grain than the fine dust covered on top.

CAPCOM Okay. The white is coarser?

DUKE That's affirm. It looks - - it sorta - - I'm not going to say ash flow but it sure looks like it was coarse white - - Let me get a better word. Let me think about that in a firm description.

CAPCOM Okay.

CAPCOM Okay, just a question now for you John. When you got to halfway or even thought it was halfway, we understand you looped around South, is that right?

YOUNG That's affirm.

CAPCOM In any of the craters that you looked into,

YOUNG Yeah, we came up on Barbara.

CAPCOM Okay, in any of the craters that you looked into, would any evidence or out crops in the walls. Anything other - - you mentioned the one boulder that was sticking out the side of Flag I think it was that - - was there any other evidence of any bed rock?

DUKE And Roger.

CAPCOM Did you see any in Buster?

YOUNG Charley didn't see any and I didn't see any.

CAPCOM Okay. No (garble) ventures.

DUKE (garble) A lot of the subdued craters. They do have rocks sticking out of them particularly at Buster and a few at Flag. The rest of them really did. The descriptive part of the whole business you know is you can't really tell by looking at a crater how big it is. I was almost willing to buy halfway for being Flag.

END OF TAPE

YOUNG The deceptive part of the whole business, you know is you can't really tell by looking at a crater how big it is. I was almost willing to buy halfways for being -- for being Flag.

CAPCOM Okay we understand.

YOUNG It's a long way from being Flag crater. Tony let me try again. The larger craters, the old subdued ones were boulder free. The only hint that I had was this north east, southwest rocks -- boulder distribution and buster and that went sort of up the wall southeast and north -- southwest to northeast. Over.

CAPCOM Right understand. I guess that's why went ahead and called it a secondary. It probably isn't it was just since it was oriented with the structure of the area.

YOUNG Man that was a big rock that came in, and if that was a secondary, I'll tell you that is a big crater. The walls on it are -- well the east wall was still in shadow to some degree with whatever our sun angle is now; we couldn't see in the bottom of Flag or Spook, the walls -- we just couldn't get up close enough to the rim to see into the bottom.

CAPCOM Okay from the TV there, I was -- a couple of times while you were walking around those rims, I was wishing we had that -- that rescue lanyard.

YOUNG Too late now there Tony.

CAPCOM Rog.

YOUNG We'd have to count on Charlie being able to crawl out of the whole he gets in.

CAPCOM Okay we're look --

DUKE When I fell down over there by the ALSEP, I crawled into one to stand up.

CAPCOM How was the footing trying to climb out of those? -- the little ones?

DUKE It's a piece of cake on those little 10 meter size.

CAPCOM Okay. On this station 10 we're perhaps considering beefing it up and letting you do some sampling in that area and from what you've been saying now it sounds like you think that the LM ALSEP area would be a good place to spend some time. You think from your experience with the drill there you could drive the double core alright? And how do the rake sample on that area look?

YOUNG Yeah, we could get a lot of rocks in the rake sample. Charlie says the double core will go.

CAPCOM We're thinking about maybe moving 10 a little bit away to get out of the LM descent and peeling paint on the LM and all this kind of stuff, so from what you've been saying if that's a ray it should be okay to move to the south-southwest.

YOUNG What peeling paint on the LM?
CAPCOM Oh your inflated paint on the top.
YOUNG Man that LM looks good from the outside.
She looks good from the outside. All that paints gone away.
CAPCOM Okay understand.
YOUNG There's still a little bit up there.
CAPCOM Okay a question here on the cosmic ray.
When that -- the red ring came off, did it bring the whole cable with it?
YOUNG No, it brought about 3 inches with it.
CAPCOM Okay, did you happen to notice if there was a 1 and a half inch hole visible in the upper left hand corner of the upper panel?
YOUNG A 1 and a half inch hole visible in the upper left hand corner of the upper panel.
CAPCOM I know, I wouldn't have noticed but the question's here -- I thought you just might have seen it.
YOUNG Well there was a bunch of squares -- squares in different samples in the upper panel but I guess everybody knows that but you say we would have made a one and a half inch hole in the whole business.
CAPCOM No you wouldn't have made the hole but it would have shown it.
YOUNG We can find out when (garble) alot of stuff tomorrow.
CAPCOM Okay. Was there any cable after you pulled the red ring off, was there any cable hanging out the bottom of the cosmic ray experiment. I mean was there any of that string left. What I'm wondering is did the string break?
YOUNG Yes, it did. I looked at the top of the -- of the panel, it did look like it -- the thing is jammed up in there. Some of the mylar in the top section was crinkled in a funny way, like it had been pulled down on it and that was the only abnormal thing that I noticed about it.
CAPCOM Could you estimate how far it moved before the thing broke?
YOUNG Yeah, at least 3 inches. How far does it have to move?
CAPCOM As long as you get any movement at all it should be alright.
YOUNG That's what I figured, I think it moved some. I mean --
CAPCOM Okay, that should give them enough information to think about back there. I'm just curious, we're curious about the position of the UV camera. We saw it on TV but it was pretty hard to get an exact location. Could you estimate how many feet down sun from the plus Z footpad and I understand its right next to the edge of the shadow.

YOUNG Okay, it is right now -- the camera is about I would say from the center of the Z footpad -- I mean the plus X footpad to the center of the bottom of the camera is about 4 and a half or 5 feet.

CAPCOM Okay now that is directly to the camera or is that in the down sun direction?

YOUNG That is in the down sun direction.

CAPCOM Okay, I understand.

YOUNG To the wide - in the wide distance, the distance to the camera is about oh maybe 5 feet from the -- up from the Z strut out to the camera is maybe 6 feet. And it looks like to me that the Sun is got to move -- I'm not sure we're not going to have to move the camera to keep it in the shade if the Sun is going to move another 20 or 30 degrees over here.

CAPCOM Okay understand the Sun looks like its coming down the top of it.

YOUNG No the Sun is not coming down on top of it.

CAPCOM No I didn't mean --

YOUNG (garble) its got to move, the shadow has got to move in oh about 12 feet before it gets into the LM or -- that's hard for me to tell from right here.

CAPCOM Okay, understand that.

YOUNG I set it up just exac -- I set it up like that picture in the book.

CAPCOM Rog. Okay, one more geology question here. Was there any difference between the rocks in the bottom of Buster and those on the rim of Buster?

DUKE You want me to guess Tony. I don't think so.

CAPCOM Okay you're right. That's all. That's all you can do.

DUKE Okay and the reason I don't think so is that the rocks in the bottom were all scatter and crumbly looking and sort of mounds of rocks with many fractures in them and which was just like the one I sampled that crumbled up in my hand, so texturely from 50 meters they look the same.

CAPCOM Okay fine. That's in -- do you have any comments on the geology?

YOUNG We didn't do enough of it.

CAPCOM I think you did an outstanding job. The back room was elated. I went back there after the EVA and talked to them and they were really excited. Really pleased with it.

YOUNG Whose in the back room now? Is Dale and Lee and Bill Muehlberger back there?

CAPCOM Yeah, I saw Dale and Lee. I didn't see -- correction I saw Dale and Bill, I didn't see Lee. I think he's on the planning team.

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YOUNG

Okay.

CAPCOM

Okay, I have your EMU summary. Were

PGA problems. Both PLSS's performed normally with no major anomalies.

END OF TAPE

CAPCOM Okay, I have your EMU summary. There were no PGA problems. Both purses performed nominally, with no major anomalies. CDR's average metabolic rate was 850 btu's an hour. The LMP's average metabolic rate was 1,050 btu's an hour. And - there's something here under several procedures in work - to work around a purge valve pin problem. I wasn't sure you had a problem.

YOUNG I don't think we've got a problem, either, if I can figure a way to keep it out of movement every time I get in and out of the LM - Rover. If I can't do that, why, I'll just keep putting it back in.

CAPCOM Okay. We'll investigate it tonight and we'll make a recommendation, if necessary, during the EVA prep tomorrow. Maybe we'll put a lanyard on the pin or something.

YOUNG Oh, Tony, now.

CAPCOM I was just reading it. Okay, the LMP has depleted both the primary and secondary water tanks, and the CDI at approximately 2 hours from landing. And the LMP's O2 use rate was higher than expected due to high metabolic rate. CDR's O2 rate was nominal.

YOUNG Mine was more than expected.

CAPCOM Okay. The medics agree.

DUKE I tell you, I expended about a - I expended about a thousand of those when I fell down.

CAPCOM Yeah. You were really puffing away, there.

DUKE Well, you've got to get up.

CAPCOM You're right. Good idea.

CAPCOM Okay. That's about all I've got except for the plans for the next couple of day, and I guess I don't have them quite yet. We'll get those to you later. Why don't you go ahead and eat?

CAPCOM If you haven't done so already.

CAPCOM Oh. One question on the food, there. You mentioned, Charlie, that one of the bags is kind of blown up. I wonder if you could describe which one it was and what it looked like.

DUKE Yeah. It's the one we're eating right now, and it's Day 5, Meal C, and it was back there in the food compartment and it was in there in its little bag, and the thing just sort of came loose and everything floated out. So the - each little sample is not - is not - the vacuum is not gone on it. It's okay, but - I mean, each part of it - but - it must have been an overbag or something.

CAPCOM Okay. Copy that.

DUKE Great. Oh, I'm looking forward to tomorrow. I - the day went so fast today, the first thing I knew I didn't have a chance to eat or get a cup of coffee or anything. It was really - really (garble) along here. Doggone exciting.

YOUNG It was pretty interesting. I think we can do a little better on the driving cross sun tomorrow.

CAPCOM Rog. You made good time coming back.

YOUNG Yeah, follow your tracks. That's the only way to fly.

DUKE Hey, Tony, if we're on time, and we got a 7 hour EVA in, what - how come we cut down - where did we lose - we must have lost it somewhere because we only had half the time at Flag - Or Spook, rather.

YOUNG Yeah, I was curious about that, too.

CAPCOM Okay. We got out of Flag about 10 minutes late, really, by the time you were really all loaded up and moving, and I can't remember right now where we lost the rest of the time.

DUKE Okay. Thank you. Let say that all our geology training, I think, has really paid off. Our sampling is really - at least, procedurally - has been real team work, and we appreciate everybody's hard work on our exemplary training.

CAPCOM Okay, and I sure think it's paying off. You guys did an outstanding job.

YOUNG Yeah. You noticed how good I carried the bag, huh?

DUKE Yeah, well, they'll be that way.

YOUNG I got the farts again. I got 'em again, Charlie. I don't know what the hell gives them to me. Certainly not - I think it's acid in the stomach. I really do.

DUKE It probably is.

YOUNG I mean, I haven't eaten this much citrus fruit in 20 years. And I'll tell you one thing, in another 12 fucking days, I ain't never eating any more. And if they offer to serve me potassium with my breakfast, I'm going to throw up. I like an occasional orange, I really do. But I'll be damned if I'm going to be buried in oranges.

YOUNG I knew all that stuff you're doing would make you work hard.

DUKE (Garble)

YOUNG Well, I don't know what the hell I was doing. You did most of my work. You unloaded the ETB and loaded the ETB and all that stuff.

DUKE (Garble). I'll tell you what it was. We never practiced that part before - of warming the water

DUKE packet. (Garble) I just stand around (garble) go out there and pick up that rock and that's the only reason - because I keep running back in. About 20 minutes before I went to the Rover, had a spike and dropped ' the uplink (garble).

DUKE (Garble)

YOUNG What'd I do with them?

DUKE What did you do with them?

YOUNG They're right there over the - Oh, they're gone. I put them up over the - right up in here. They ain't there? Oh, shit. They must be on the floor, then. Is all that ripped open or something, Charlie?

CAPCOM Orion, Houston.

YOUNG Yes, sir.

CAPCOM Okay, you're on your way to have a hot nuke.

YOUNG Oh. How long have we had that?

CAPCOM Okay. It's been on through the debriefing.

YOUNG How could we be on hot mike with normal voice?

CAPCOM John, how do you have your intercom set up?

YOUNG I'm in S-Band to PR, ICS to PR, relay is Off, mode is RCSVTP, audio control is Normal, VHF A is Receive, VHF B is Off.

CAPCOM John, would you exercise your - push the talk button. It may be stuck.

YOUNG Yeah, Houston.

CAPCOM John, it doesn't seem to be a hot mike now. Evidently you got it off.

YOUNG Okay. Fine.

CAPCOM John, how do you read me?

YOUNG Loud and clear. Over. How do you read? Over.

CAPCOM Okay, John, while we're reading, just let me pass a message on to you. Number 1, you guys did a beautiful job there today. We're real happy with it down here. Tony told you, the plan tomorrow is to run a full 7 -

END OF TAPE

CAPCOM John, while you're eating, just let me pass a message on to you. That number 1 - you guys did a beautiful job there today, we're real happy with it down here. Tony told you plan tomorrow is to run a full 7 hours and our plan beyond that is to give you a little longer day than usual tomorrow and the following day run a third EVA for about 5 hours, then go ahead and launch and what rendezvous and try to do is hold you to about an 18 hour day total, which means hang on to the LM and go into a sleep cycle. So that's kind of a master plan at this point.

ORION Okay, fine.

CAPCOM And we hope you're going to get lots of rest here tonight, you've got plenty of time to do it, and of course with only 2 meals a day, why you ought to be hungry enough to push the heck out of that, but as long as your feeling good, why everybody will be real happy down here, and you go as far as you feel like going.

ORION That's what we're doing.

CAPCOM Roger.

ORION Yes.

CAPCOM Yeah, fellows, I'll see you in the morning, have a good sleep.

ORION Thank you.

CAPCOM ORION, Houston.

ORION Go ahead.

CAPCOM Roger, just wanted to confirm that you guys are recharging PLSS's, we're showing a little high of water usage and assumed that was the case.

ORION No we're not, we're just drinking alot. We fill that drink bag, juice bags, and food juices.

CAPCOM Okay, fine, we just a little gitchy down here based on previous experiences with leak.

ORION Well, we - we looked - just looked back in the back on - try to find a lost item and we looked all through the backend and there's - there's some condensation on the ECS side, but there's no leaks back there.

CAPCOM Okay, everybody's happy. ORION, we're not disturbing your dinner there would you comment on whether you found anything that accounted for that hot mike situation awhile back?

ORION Well, unless it was a stuck mike button, that's the only thing we can think of because our comms configuration was normal.

CAPCOM Okay.

ORION Sorry about that, but it - it's terrible being on a hot mike here sometimes.

CAPCOM Well, you guys have done commendably well, considering the fact that you didn't know you were on it.

CAPCOM We're very happy with your -
ORION Thank you.
CAPCOM I wish we could say the same for some
of the people down here.
ORION Yes.
ORION Houston, we get ready to start
the PLSS O2 and H2 recharge. It's an hour past since our
initial O2 recharge. Over.
CAPCOM That's good.
ORION Your clipping a little bit. Say again.
CAPCOM Roger, go ahead.
CAPCOM Your clear.
ORION Thank you.
ORION Okay, Houston, we are going to start the
water recharge right now.
CAPCOM Okay.
ORION Okay, we've started the water fill, give
us a hack at 5 minutes please, Houston.
CAPCOM Roger, will do.
ORION Houston, ORION.
CAPCOM Go ahead ORION, Houston here.
ORION Rog, if all goes according to schedule
on this plan you sent up, what would be our total lunar surface
stay time?
CAPCOM About 19 hours. Are you talking about
surface stay time, I'm sorry, I'm giving you EVA time. Well, hand
on a second, we'll have to figure that one out.
CAPCOM Appreciate it, Doyle. Okay. Thank you. Okay,
Charlie, you got 5 minutes and your total lunar surface time would
be about 71 hours, a round number.
ORION Thank - Thank you, Boss.

END OF TAPE

YOUNG Okay, Charlie's charging his PLSS with water and he just started 5 minutes about 5 seconds ago. Can you keep time on that for us Houston?

CAPCOM Rog. Got her running.

YOUNG Okay. What is this water problem that Charlies telling me you think we've got? Should we start looking for leaks?

CAPCOM No, relax on that John. They just noticed higher than normal usage and you know we had that leak -- I guess it was on 15 that we discovered when people were resting. Just wanted to make sure that you weren't doing something that was using high usage.

YOUNG Okay, we were drinking plenty of it, I'll tell you that.

CAPCOM That's good for you. How's the temperature on it. Does it taste pretty good?

YOUNG Yeah, it's pretty good.

DUKE Yeah, it's good water. It really is.

CAPCOM Great.

DUKE I never thought water had a flavor to it but this has really got a good flavor.

CAPCOM That's that good high calorie iodine in it that does that for you.

DUKE That's probably what we really need.

CAPCOM Yeah, you guys are in a good shot there today, wish we had something a little stronger to give you.

DUKE You just keep it on the cooler boss, we'll be back and take you up on that.

CAPCOM Okay.

YOUNG I'll tell you that's really -- that's really a nice place to work. Once you get out in the open like that, that is really something.

CAPCOM Yeah, that was pretty impressive. Looked real great on the TV and you guys did a real beautiful job there. Looks like you were lucky to find a place big enough to land in.

YOUNG (garble) thanks we appreciate it. Yeah I -- I've got second thoughts right now as to whether or not that was luck or skill. I thought it was being pretty skillful because I could see all the way to the -- I could see all the way to the ground and then we got out and I noticed that we were kind of close to the crater so I went forward a little. Then we got out and shoot we hadn't landed more than about 10 feet beyond this big thing.

CAPCOM That's (garble) John.

YOUNG And it -- that's right. I didn't realize we'd come in so close to it. I think I was backing up just a hair before we -- before we landed, although the -- although the probe seemed to broke straight up and down.

CAPCOM Rog. Sounds like you had essentially no velocity except vertical.

DUKE That -- Dick the landing didn't seem that hard but we must have stroked the gear -- the bell is about 10 inches off -- less than that about 4 or 5 inches off the ground but the MESA was sitting right on the ground. We had to pick it way up and the ALSEP was less than eye level really.

CAPCOM Well it could be our simulation isn't all that good either.

DUKE That's true.

CAPCOM Okay, we got 5 minutes on your PLSS there.

DUKE Rog. Thank you.

YOUNG I just did that so the guys on the ground would know when we were using this water as much.

CAPCOM Rog. That's a good idea.

YOUNG Are we completed the -- have we completed the (garble) -- the charges of both PLSS's now?

CAPCOM Roger.

YOUNG We're rescheduling another EVA in 2 or 3 hours here.

CAPCOM Well if you're ready to run, we could probably work that out in about an hour or so.

YOUNG It's amazing how much better you feel when you sit around for a couple of hours afterwards. Boy when we got in we were pretty -- pretty well convinced that we could not do a heck of alot more but I think it's just like any other training exercise, once you sit around for a couple of hours you're ready to go again. I think we are.

CAPCOM Rog. Well we got a nice casual schedule from here so you might as well power down and get a good 8 hours of snoozing. You'll really feel like it in the morning.

YOUNG That's what we're going to do.

CAPCOM How are the fingers feeling at this point?
A little better?

YOUNG Yeah, thats -- my fingers -- it wasn't my fingers so much as my knuckles. I don't really understand it but -- it's going to be very interesting to see what I'm going to do with them.

CAPCOM Rog.

PAO This is Apollo Control at 130 hours 22 minutes ground elapsed time. The crew of ORION at the present time preparing for a 8 hour sleep period. CASPER now some 34 minutes away from loss of signal on the 29th lunar revolution. We'll stay up with the crew of ORION until they close out for the night. CAPCOM for ORION during this shift is Deke Slayton, Stu Roosa meanwhile is talking to Ken Mattingly occassionally, as he runs through his orbital science experiments aboard CASPER. At 130 hours 23 minutes, this is Apollo Control.

END OF TAPE

DUKE Houston, Orion. Whose biomed do you want to watch tonight.

CAPCOM Stand by one. Okay, biomed on the right hand side Charley.

DUKE Okay, you going to watch me again tonight?

CAPCOM Yeah, you apparently painted a pretty picture for them, they like you.

DUKE Okay.

YOUNG Okay. Houston, this is John. I'm going to be on comm tonight. I'm going to get Charley some good sleep, okay.

CAPCOM Okay. Fine. Yeah, that wasn't anything magic about our input there.

DUKE Yeah, he got good sleep last night as a matter of fact. So did I.

CAPCOM Roger. That's correct.

DUKE We agree.

DUKE Couldn't ever believe we'd go to sleep Dick, but imagine this guy John sleeps like a baby up here, I've never seen it.

CAPCOM It sounds like the best place in the world to sleep. Wish I was with him.

SPEAKER We do to boss.

CAPCOM Orion. Houston.

YOUNG Go ahead.

CAPCOM Roger. We have a short flight plan update for tomorrow. Here's some miscellaneous items if you want to go ahead and take them now.

YOUNG Stand by for about 20 seconds.

CAPCOM Okay.

YOUNG Go ahead.

CAPCOM Okay. This is in your checklist 3-7, right hand side of the page. Following emptying ETB, where it shows 1 HCEX Mag B, delete that line.

YOUNG Okay.

CAPCOM Okay. And then add that line down further on the page where it says Stow in ETB, 1 HCEX Mag B.

YOUNG Okay. Copy.

CAPCOM Okay. On the left side page about half way down where he have - - looks for Revs 25 thru 31, that is now a 34 to 39 and the two lines below that I believe have already been deleted but double check that.

YOUNG Okay. 34 to 39 and your right Deke, we already deleted that.

CAPCOM Okay. Now, page 38. Right hand side half way down. Delete two lines, change LM and ECS, look in my dark side cartridge. Then the one below it, stow used carthridge with ESLS bag.

YOUNG Okay.
CAPCOM And 39, delete the whole page.
YOUNG We got it. Go ahead.
CAPCOM Okay. 43, the three VA2 prep card on this
one. We'll enter all those on that page.
YOUNG Stand by.
CAPCOM Okay.

END OF TAPE

ORION (garble)
CAPCOM Okay.
YOUNG Okay go ahead.
CAPCOM Okay on the right side of the card, in the middle after comm, these are all add ons. There's about 6 line items of add on under there, which we have fit on our card. You are going to start up above that column to do it. First is S-band mod PM.
YOUNG Okay, keep reading them.
CAPCOM Okay.
YOUNG I got that S-band CM.
CAPCOM Okay. Next transmitter/receiver secondary, power amp secondary, voice down voice backup. PCM PCM range off, okay then down about 5 lines there your TLM biomed where it says off should be left and 3 lines below there where it says recorder on should be off.
YOUNG Okay copy S-band to PM, power amp to secondary, transmitter/receiver secondary, down voice backup, PCM to PCM, ranging off, telemetry left and recorders scratch.
CAPCOM Affirmative. Okay next change is 5-3. On 53 the right hand column, battery management, delete that whole column.
YOUNG Okay, delete it.
CAPCOM Rog, okay page 54. Left column, bottom of the page, last 2 lines, delete TLM PCM low and S-band voice down to voice backup.
YOUNG Copy.
CAPCOM Okay, then on the bottom of the right hand side, 3 lines up from the bottom, cabin gas return where it is AUTO change to open.
YOUNG Copy.
CAPCOM Okay page 55, middle left hand column. Delete stow LM SCS, lithium hydroxide and bracket aft of engine cover. And the bottom of the page --
YOUNG Alright go.
CAPCOM Rog. Bottom of the page where it's rev 32 36 should now be revs 40 to 45. Okay next change is --
YOUNG Go ahead.
CAPCOM Okay next change is 56, bottom of the page below MCC conference add 153 45, change LM PCS, lithium hydroxide cartridge and stow cartridge in bracket and jet bag.
YOUNG Okay, 153 45, we change the LiOH and we stow the cartridge and the bracket in the jet bag.
CAPCOM That's affirmative and then same page, top of the right hand eliminate row 30 VERB 37 enter that line and also standby light on and that's all the changes we have here.
YOUNG Okay fine. Next line down that EPS for

YOUNG sleep. We'll go cabin gas return to open again Dave.

CAPCOM Okay and standby one here. I believe we've got a comm configuration they wanted to change on you. Just a second. Okay ORION Houston.

YOUNG Go ahead.

CAPCOM Okay we're going to try a configuration change here on your comm to save a little power trying to hold low bit rate with an 85 foot dish and which means select low bit rate voice off, open the power amp circuit breaker and wait about 4 minutes and then return to the opposite configuration. Do not touch the power amp switch and you'll have no comm during this period of 4 minutes. Want me to go back through that slow?

YOUNG Yep, could you run through it again slow?

CAPCOM Okay, you can go low bit rates. You can do that right now.

YOUNG That's done.

CAPCOM Okay, standby one. Okay now you can go voice off, at the conclusion of that of course we'll be out of contact with you. Open the power amp circuit breaker and then standby for 4 minutes. Then return to the original configuration.

YOUNG Okay, we got it.

CAPCOM Okay. ORION Houston you can now turn voice on again, close the power amp, apparently their little test didn't work.

END OF TAPE

ORION Okay, Houston, ORION, we're back up in comm configuration. How do you read? Over.

CAPCOM Rog, read you 5 by 5 and we've just got one final thing to do and let you salt down for the evening. Just wanted to double check that you got your suit hose connectors red to red, blue to blue.

ORION Deke, we're just going to get - we've been drying out the suits - we're going to configure the EPS for sleep momentarily.

CAPCOM Okay, as soon as you're through with that give us a call and turn your voice off and go to sleep. Sleep tight.

ORION Roger.

CAPCOM And we've got a full 8 hours programed for whenever you power down and it gives you plenty of time tomorrow to do everything you've got to do so don't sweat it.

ORION Okay, I was right pleased that we could get through that today. I thought it was going to be kinda tight and I was pleased that we got as much done as we did.

CAPCOM So was everybody else.

ORION I guess I'm sorry - I'm sorry - that sorry that we had that accident with that cable but I - we probably should improve our training on those lines, but I don't know what else to do.

CAPCOM Rog, can't win them all, John. That was a beautiful job, you guys were right on the line all the way. For your information we do have some people playing around with a potential fix for that heat flow thing but my personal opinion is that it isn't going to work and I don't think that it's worth the bother. We'll talk to you about that later, if it looks like it's at all possible.

ORION Roger.

END OF TAPE

PAO This is Apollo Control at 131 hours 21 minutes. Apparently Duke and Young aboard Orion have infact gone to bed without making that final call. After getting their ECS system configured for the sleep period the spacecraft communicator had been talking to Orion earlier. Deke Slayton has packed up his head set and gone home. Stu Roosa is monitoring air-ground 1 or Orion and air-ground 2 Casper for any future conversations. As Casper made the last front side pass during revolution 29.

YOUNG We're going to sleep and we'll be seeing you in the morning.

CAPCOM Okay, John. I guess we're all ready for you to go to sleep. But one thing we want you - -stand by. We want your suit ISOL valve to connect. I hope that's the right termenology for you lemies.

YOUNG We got suit flow and suit disconnect. What do you want?

CAPCOM Okay, we want the CDR's hose to connect. And suit to flow.

Young I - - you're snowing me there. I - - what do you want? Want flow through hose or not?

CAPCOM Okay. We want the CDR's suit ISOL to flow. We want it the same configuration as oh percey over there.

YOUNG The CDR's suit ISOL valve to flow.

CAPCOM That's affirmative.

YOUNG Okay. You want it to flow.

CAPCOM Okay. It looks good.

YOUNG Okay.

CAPCOM And good night.

YOUNG Good night to you guys. Thank you much for a good day. Enjoyed it.

CAPCOM Okay. We'll look forward to a big and better one tomorrow.

PAO This is Apollo Control Control. Apparently that was the final good night. We had assumed here that they had gone on off to sleep, but apparently not. As Casper made the front side pass on revolution 29, the orbit measured 54.9 nautical miles by 64.7, 16 minutes before acquisition of signal from command module. Casper starting it's 30th lunar orbit. And at 131 hours 26 minutes I'm signing off except for hourly status checks. This is Apollo Control.

END OF TAPE.

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 2309 GET 131:26 MC-501/1

YOUNG Houston, 16. Over.

CAPCOM Go ahead Orion.

YOUNG Okay, this is Orion. Could we put our A0 TV pin to either 4 or 6 because the sun is shining right in it right now and it's lighted up the whole cock pit even though we'er all - - got the lights turned down. It's just like we got a big spot in here. Or is that not possible?

CAPCOM Okay. Stand by.

CAPCOM Okay. John, the word is you can put it in any position you want if that will solve your problem. We don't care.

YOUNG Okay. Thank you.

YOUNG That solved our problem in D pan 6. Thanks a lot, Houston.

CAPCOM Rog. Orion. And good night again.

END OF TAPE

PAO This is Apollo Control. We've just had acquisition as CASPER came around on the front side on revolution 30. Let's join Ken Mattingly and Stu Roosa's conversation as Mattingly describes some of the experiments he's been conducting and some of the geological features he's been observing from orbital altitude.

CAPCOM And Ken, I notice here this is suppose to be in the middle of your eat period. Are you eating?

MATTINGLY Well, as a matter of fact, I just looked and noticed that it was an eat period. I guess I will go do same. I got all carried away with this being the first time I've had a chance to look to the south.

CAPCOM Okay, when we come up down here, in about 7 or 8 minutes, why we're showing this pan camera to have the power on so we can take a look at it; we want to play a couple of little games with the V over H override switch, at that time to see if we can find one of the positions of that switch that might have a little less affect on our sensor -- you know that was -- that was a change and we're noticing the sensor is been detecting lower light levels than it should, so we're goin to put the switch to high altitude for a couple of minutes, then low altitude for a couple of minutes and we'll give you a call on all those.

MATTINGLY Okay. Just tell me what you want and I'll go down here and put my nose in the feed bucket.

CAPCOM Okay.

MATTINGLY Seems like I ate just a couple of minutes ago.

CAPCOM CASPER Houston.

MATTINGLY Go ahead.

CAPCOM Okay if you got time there in mixing up your food, we'd like to have the pan camera to standby and the power on.

MATTINGLY Okay, pan camera to standby and power on. I'm - I'm okay - Okay and power's on, the talk back is barber poling and again it's gray.

CAPCOM Okay and let's go on the V over H override to high altitude now Ken.

MATTINGLY Okay, the V over H override high altitude mark.

CAPCOM Okay. Okay Ken if you'll give us low altitude on the V over H override.

MATTINGLY Okay, going low altitude, Mark.

CAPCOM Okay. Okay Ken you can go to center off position on the V over H override and you can go AUTO on the high gain.

MATTINGLY Okay, V over H override is center off and high gain is in AUTO.

CAPCOM Okay. And Ken just for your info, the field geology team in the final phase of making their plans for EVA 2 tomorrow, so if you've got any additional comments, why better make them this pass because they'll have it all firmed up.

MATTINGLY No, I think the - they're smarter than I am.

CAPCOM Well now don't get too carried away up there.

MATTINGLY No, I would really -- I really hope they make it in the North Ray though that -- I think that's going to be different than what we expected it to be.

CAPCOM Rog. Okay Ken we're ready for pan camera power to off at this time.

MATTINGLY Okay, pan camera power's coming off. Mark.

CAPCOM Okay we got it. Hey Ken, how'd we make out in our discussion on North Ray low altitude there as far as being able to see the white albedo or not or were you too far to the south?

MATTINGLY No, I got ahead. It depends which rev you want to talk about. On -- well I looked at her on the first day, right after DOI, there wasn't any -- there was 2 craters but no rays. When I went back and looked at him on landing morning, there's a slight ray but North Ray still doesn't stand out as being big bright guy that South Ray does.

CAPCOM Well it's obvious I was talking about the landing day.

MATTINGLY I gathered that it would be the case.

CAPCOM Yeah, by all means.

MATTINGLY Right now I would agree with you on anything
Stu.

CAPCOM Yeah, I'll

END OF TAPE

CASPER Right now, I would agree with you on anything, Stu.

CAPCOM Yeah, I'll - I'll be talking -

CASPER I'm up here with my -

CAPCOM I'll be potato soup and my - Ah.

CAPCOM Yeah, I ought - I'll be quiet here and let you concentrate on your eating.

CASPER Oh man, this is gourmet on style. I got I got the modern jazz quartet playing Porgy and Bess and I got orange grapefruit, some of it in the bags, some of it on the bulkhead, potato soup and man, I'm - it's real gourmet style. Even got a beta candle.

CAPCOM Hey Ken, with all of that now a while ago you talked about some Casperellos with all that Beta candle and all that food you don't have any such thing as a Casperessas, do you?

CASPER No, afraid I left that at home.

CAPCOM Rog.

CASPER That's about all this place is lacking though.

CAPCOM And Ken, just another comment to close the loop on you on that P23's. And the - like I said before the marking data was very good and you came up with an horizon of 33 and loaded is a value of 28 and after massaging all the data decided to not change it since we've shown on the other missions that coming back, you have a tendency to have a lower horizon so looks like we're just swinging with what we've got there.

CASPER Okay, that's just fine.

CASPER Hey, Stu.

CAPCOM Yeah, go ahead.

CASPER Couldn't pass up a chance of watching landing site one more time and so I took a quick break from chow and went and watched it and - and a couple questions in mind and I only got 2 of them answered. One of them is that counting the layers in North and South Rays, South Ray looks different than North and South Ray shows 3 distinct light and dark sequences and I suspect their slumps but there's at least 3 bands. North Ray doesn't have any of that sort of thing it's obvious from this altitude. I took another look for their too their terraces and the whole area, the thing that we thought looked so distinctly different in the photographs it looked like Stone Mountain and Smoky Mountain or 2 different things and something came into the middle of it and it doesn't look that way to me at all today. It looks to me like it's really all - almost all part of the same material. And I've drawn another little mark on my map. It's just about where you folks said you thought the LM was, except a little further to the north. It turns out that there's one little bright speckle

CASPER that doesn't look like craters and I don't see anything except the speckled.

CAPCOM Okay, - I'm I'm looking there. Now just go straight north of the of the LM and a little to the west there's 3 small craters there that are covered with looks like byray, Now where are you talking from that.

CAPCOM Okay, Ken, did you fade out, or did you stop talking. How do you read.

CASPER Hey I had you off of vox and I forgot to push the key down - I had gotten so use - no I gave you an 80 and about - oh, you were looking in the right area. And let me see what I can give for coordinates on that. How about CB 5 and 80.

CAPCOM Okay, we've got CB 5 and 80.

CASPER Okay, and you know what - I'm not over head long enough to be sure that that's what I'm looking at but it looked to me like it had a different kind of glint to it.

CAPCOM Okay. I'm sure they've got that.

CASPER Okay, I've got one.

CASPER Well, I missed it, by the time I got the camera it was gone. That little build up that we talked that was just to the west of LaSalle I had it spotted and I was grabbing for the camera and I couldn't find it again after I got back.

CAPCOM Okay, and Ken, if you want to go accept we'll uplink the jett monitor load and it's your choice whether you want us to initiate it or you want to initiate it.

CASPER Oh, you guys can do that.

CAPCOM Okay, we've got - copy that. Okay, Ken, the computer is yours. Go to block and the EMP is running.

CASPER Okay, thank you very much. You guys are really helpful.

END OF TAPE

CAPCOM And Casper, Houston.
CASPER Be with you in a second. Okay, go ahead Stu.
CAPCOM Okay. We'er showing the lower 14 minutes to
LOS but we'er going to loose data before that and we'd like to
get that E memory dump anytime your ready. We're all configured.
CASPER You got it.
CAPCOM Okay. And Ken on the high gain we'd like
a react, we'd like pitch, zero, yaw 170.
Casper Okay, you have react pitch, zero, yaw 170.
CAPCOM Okay.
CAPCOM Okay. Ken, we'er going to loose comm with
you here shortly. And we'd like to get your onboard readouts
and if you would get your look to copy, we've got a TEI 41 pad.
CASPER Okay. Let's see. Okay, I'll give you some
readouts first, battery C is 36.7, battery B 36.3, battery A
36.8. I guess all you really needed out of that was battery C
though. Now you'd like the pyro's okay. Their - - A is 36.7
and B is 36.7.
CAPCOM Okay. We've got all of those. You missed
your RCS.
CASPER And you'd like to have - - you want the
quantities.
CAPCOM That's affirmative.
CASPER Okay. A - - 63 percent, brovo shows 62
percent.
CAPCOM And Ken let's go auto now with the high gain.
We'er going to loose you in react.
CASPER Okay. You've got auto. Charley is 66 and
Delta is 67.
CAPCOM Okay. We've got all of those and I'd like
to give you a TEI 41 pad.
CASPER Standing by for copy.
CAPCOM Okay, it's TEI 41. SPS G&N, 38709 plus
072 plus 133 155 06 58 45 plus 33 552 plus 11 510 minus 02 350
181 095 020, rest of the pad NA. The GDC align is same as
cert. Ullage 2 jet 17 seconds. Longitude (garble). plus
17329 assumes no LOPC 1.
CASPER Okay. TEI 41 SPS G&N 38709 plus 072 plus 133
155 06 58 45 plus 33 552 plus 11 510 minus 02 350 181 095 020,
series in original with the same numbers per cert. 2 jet 17
seconds. Lambda 17329 and no LOPC 1.
CAPCOM Okay. That's a good readback and we'd like
to bid you good night and remind you that your logic power for
the SIM bay is still off.
CASPER Okay. Thank you very much. I'll see you
tomorrow.
CAPCOM Okan. And we'd like to have react at LOS.
And that will be pitch, zero, yaw 170

CASPER I will give it.

CASPER I have pitch or roll, what 170 set in?

CAPCOM Okay. Get a good night sleep.

CASPER Okay. Good Stu. Yes sir, thank you very much, you've been a big help.

CAPCOM They'll see you tomorrow.

CASPER Okay.

PAO This is Apollo Control 132 hours 56 minutes ground elapsed time. We've had loss of signal now with command service module Casper. Ken Mattingly and Stu Roosa met each other good night about 4 minutes prior to LOS. Some 6 hours 28 minutes remaining in the sleep period for the crew of Orion at Hadley or as you were Descartes landing site. We're looking toward EVA 2 starting around 141 hours 43 minutes or possibly as late as 142 hours depending on what time the crew does indeed wake up. How much time it takes for EVA preparations, eating, getting suited up and we make get back on the new timeline inspite of the fact they were over an hour late in commencing their sleep period. EVA 2 will be a full 7 hour EVA. Here in the Mission Control Center things are rather quite. EVA 1 vidio tape color tape is being played back and those flight controllers who aren't busy planning tormorrow's activities are getting a glimpse of the EVA that took part - - took place yesterday while they were probably a sleep. At 132:58 this is Apollo Control.

END OF TAPE

PAO This is Apollo Control 134 hours 47 minutes into the mission of Apollo 16. All 3 crewmen and CASPER and ORION still asleep at this time. CASPER nearing the end of its 31st lunar orbit some 5 minutes and 56 seconds until loss of signal. No communications with Mattingly at all this rev. He said his final good night at the end of the previous revolution. 4 and a half hours remaining in the scheduled sleep period for Duke and Young aboard ORION who will have a second 7 hour Extravehicular Activity period later in the day. All's well with both vehicles. No systems problems that have arisen. After Duke and Young had signed off, they came back up and said they -- optical telescope in the lunar module used for navigation -- optical navigation was apparently pointed near the Sun and was projecting a spot-like -- like illumination inside the cabin making it difficult to go to sleep and requested permission to twist the AOT or the optical alignment telescope around to where the upper end of the instrument would not be facing the Sun. The people here had no objections. They in affect dimmed the spotlight by turning it to a different detent position. Still showing a playback for the benefit of the gold team flight controllers who have to sleep during the day. Of the first EVA still being shown on the large color ida 4 at 134 50 this is Apollo Control.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4-22-72 GET 135:34 CST 03:16 MC-506/1

PAO This is Apollo Control Houston at 135 hours 35 minutes ground elapsed time. The crew aboard ORION is -- is sleeping as is Ken Mattingly aboard CASPER. We show the command module presently in an orbit of 64.4 nautical miles by 55.2 nautical miles. Meanwhile in the Mission Control Center, we've had a change of shift. Gene Kranz's team of white flight controllers are now aboard. Our CAPCOM at this time, astronaut Don Peterson who has replaced Stu Roosa at this position. We expect no conversation with the crew of Apollo 16 but should one develop, we will pass that along. We're at 135 hours 36 minutes, this is Apollo Control Houston.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/22/72 CST 4:14 GET 136:32 MC-507/1

PAO This is Apollo Control Houston at 136 hours 33 minutes ground elapsed time. The crew of Apollo 16 still in their rest period. Our countdown clock in Mission Control shows 2 hours 52 minutes of sleep time remaining. We've had no conversation with the crew over the past hour. We're at 136 hours 33 minutes, continuing to monitor the displays and conversations at Mission Control. This is Apollo Control Houston.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4-22-72 CST 5:15 GET 137:32 MC-508/1

PAO This is Apollo Control Houston at 137 hours 33 minutes ground elapsed time. We show 1 hour and 52 minutes remaining on the rest schedule of the crew of Apollo 16. Our present schedule calls for cabin depress for the start of EVA 2 at 143 hours 2 minutes ground elapsed time. At 137 hours 33 minutes, this is Apollo Control Houston.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/22/72 CST 6:14 GET 138:32 MC-509/1

PAO This is Apollo Control Houston at 138 hours and 32 minutes ground elapsed time. We show 53 minutes until time of crew wake-up. Presently, Casper is in an orbit 64.1 nautical miles by 55.3 nautical miles and on its 33rd revolution around the Moon. At 138 hours 33 minutes, continuing to monitor, this is Apollo Control Houston.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/22/72 CST 6:58 GET 139:16 MC-510/1

PAO This is Apollo Control Houston at 139 hours 17 minutes at ground elapsed time. We're some 8 minutes away, now, from time of crew wake-up. We'll leave the release line up live at this time, in the event we should hear from the crew before the 8 minutes elapse. We're at 139 hours 17 minutes, continuing to monitor. This is Apollo Control Houston.

END OF TAPE

ORION How much (garble) Houston, over.
CAPCOM Houston to ORION.
CAPCOM Houston to ORION. Over.
ORION Well, Houston, (garble)
ORION Houston, Orion. Over.
CAPCOM Orion, Houston. How do you read?
ORION Roger. What time are we supposed to
get up? Over.
CAPCOM John, I can't understand you. We'd
like if you're reading to go down voice back up.
ORION Okay. What time is wakeup time?
CAPCOM You're about 3-1/2 minutes from normal
wakeup now.
ORION Okay, we timed it pretty good.
CAPCOM Looks like you timed it just about right
on your own.
CAPCOM Orion, Houston. Voice check.
ORION We're reading you loud and clear on
downvoice backup. Over.
CAPCOM Okay, we're reading you a little better,
too.
ORION How did the system look last night.
CAPCOM Everything looked real good, John.
PAO This is Apollo Control Houston at 139
hours 25 minutes ground elapsed time. We heard briefly
from John Young aboard the Orion spacecraft on the lunar
surface checking on wakeup time.

END OF TAPE

YOUNG Houston, 16.
DUKE Hello Houston, 16, over.
CAPCOM Good morning, Charlie, how are you?
DUKE I guess it is 16, Houston. Fine. Guess we'll
16. I need to (garble) Tony.
CAPCOM Okay, Charlie, I guess the bottom end
look good. How do you feel this morning?
DUKE I feel great. Why don't you have the doc
tell me how much they think I've slept?
PAO That's Charlie Duke we're hearing from now
aboard the Orion.
CAPCOM Okay. They think you've slept 6 hours.
DUKE Okay, fine. I was going to say 7. Of
course, I don't know exactly when we got started but once we got
started it was just like baby except for one time I woke up
to -- when I got cold and I had to put on my sleeping bag.
CAPCOM Outstanding.
DUKE Okay, here we go with the sleep status
report. First I'd like to say that we started towards that pill
really, and still if you need anything, I tell you, one of those
pills, you'll feel a whole roman army on manuever for two days,
but John, he ate the yesterday pill day 5 pill C and day 6
pill A and day 5 pill C. John ate everything for the EVA average,
and the day 6 pill A which was breakfast yesterday, John ate every-
thing except that ham steak -- (garble) ham steak. He got
7 hours and 15 minutes sleep last night and he took (garble), over.
CAPCOM Okay, we got that, Charlie.
PAO That's Tony England speaking from Mission
Control. He has just taken over the CAPCOM's position. We're
up to 139 hours 37 minutes ground elapsed time.
DUKE Okay, turning to my page on 85 DOC.
CAPCOM (garble)?
DUKE 85-DOC. You can describe the chocolate
pudding. And I ate everything else plus the EVA-7. John, also,
has an EVA-7. On date 6, DOA, I ate everything but the ham-
steak, over.
CAPCOM Okay, we copy.
DUKE And I said I got 7 hours, but whatever
you all say, I feel real good. Feel great.
CAPCOM Okay, before you all get too covered up,
we'd like you to check your bio-med sensors. And did you take
any medication?
DUKE Yeah, I took another Seconal again to
start off and I guess my bio-med is good. John's looks firm
as it could be.
CAPCOM Okay.

END OF TAPE

CAPCOM Okay before you all get too covered up, we'd like you to check you biomed sensors and did you take any medication?

DUKE Yes I took another (garble) again to start off. And I guess my biomed is good and John's looked (garble) as they can be.

CAPCOM Okay.

DUKE Now we're going to start the chow. And well I guess I'll copy the liftoff right at the first if you have it.

CAPCOM Say again Charlie.

DUKE Rog. Do you have those liftoff times for us?

CAPCOM Okay standby one.

CAPCOM Okay Apollo 16. We don't have that block time yet. We'll get it to you in a minute. We have a couple of questions about the heat flow again. If you want to think about those.

DUKE Go ahead.

CAPCOM Okay. That heat flow cable that fits into the central station is connected to a fitted circuit board inside the connector there. And we're curious about the end of the cable. Does it have any of that printed circuit board on it or is it just a free end of a ribbon cable?

DUKE Tony I was thinking about that last night and it looks like to me that it might have some of that printed circuit. All I can say is that the end of the cable is very smooth and it's -- and it's (garble) and I think the printed circuit is pretty silver, but I'm not really positive. That's something you can think about. And it is -- and it is very smooth and around the connector it is very smooth there also. And if John kicked that thing out of there it came right out of there without -- without moving the central station at all, over.

CAPCOM Okay. How about that -- the PSC? The passive seismic cable. Is it that tight? What we have to decide here is -- if you move the central station will it disturb the PSC. That thing is uncaged now and you can't recage it. So we can't afford to move it.

DUKE Well he said it's -- he thinks it's pretty tight, John does, but I can't remember. How far do you want to move it?

CAPCOM Well what we're thinking about is if we did ask you to take off that astraconnector on the heat flow experiment you may have to lift the station up to get underneath to the little lever.

APOLLO 16 MISSION COMMENTARY 4/22/72 CST 7:20 GET 139:38 513/2

DUKE Yes. But Tony everybody's told me (garble) and once you got that little beauty on there you can't get it off.

CAPCOM We're working on that now.

DUKE Yes I think there's a little pin or something in there you have to push in. And I don't know whether we got the tools for that. Well I think we could do that. It's not that tight. I think we could do that (garble).

CAPCOM Okay understand. Fredo's been over running suited down, this heat flow experiment, to see if the procedure is effective. We don't have a decision yet. We don't want to get you all excited about, but we'll have something -- yes or no in about 45 minutes.

DUKE Well I guess we'll still be here.

CAPCOM Okay.

PAO The fredo referred to by Tony England is Fred Hayes --

END OF TAPE

PAO This one is Fred Haise, the backup commander for Apollo 16. We're at 139 hours 34 minutes ground elapsed time. This is Apollo Control Houston.

ORION Tony, if I thought yesterdays meal was big, you ought to see this one. (garble) there's a lot of chow here.

CAPCOM Charlie, which meal did you say you were eating?

ORION It's breakfast, day 7, meal A.

CAPCOM Okay. We're trying to put a little weight on you.

ORION Day 6 meal B tonight. Say a big orange right now.

CAPCOM I could just sit here and talk a few words about the traverse today if you like. I haven't really organized the - my notes on it so it may ramble a little bit, but I've gotten a briefing by the planning team. It looks like an interesting plan here. The traverse is almost - well it's exactly like normal EVA 2. From Ken's words, he can see definite benches in Stone mountain and thinks that you'll have a pretty good chance of identifying them. He can see layers in South Ray, which makes the rays at station 8 a whole lot more interesting then we had even anticipated. So right now we'd like you to do the normal 4, 5, and 6. The main thing identifying 6 is being on the - on the slope part of the down - the bottom of the slope of the lowest bench, station 5 being on top of the first bench and station 4 being on top of the second bench. In fact, it may be a little above. Right now we're thinking that we won't have you aim for Crown, because Crown is probably a little bit more subdued then we'd like and probably not worth the effort to get to. Sinco D and E is like we talked about before. Probably be station 4, probably be a good place. At the end of station 5, we may have you do an LTM, I'll update this all in real time for you, I'm just talking about what we'll probably do here. And at station 7 we're going to eliminate and save the whole time and put it at station 10 so you'll be able to do that primary sampling we asked for. I think that sounds great. As you drive from 6 to 8, we're wanting you to get some pictures of Stubby as you go along that area because we don't have station 7 so we'll ask you to turn your DAK over that way as you're driving. A DAK pointed down sun probably wouldn't see much anyway in that zero phase.

ORION Okay, Tony, I think we'll be able to come up on (garble). It looks like maybe we'll be able to see if South Ray is lighted and Stubby and all the craters.

ORION The general topography here is a down-slope -- North Ray, it leads from the ridge out to all the way down to South Ray, and with the lowest point really being maybe south of Survey Ridge. Over.

CAPCOM Okay, right. And we can see -- I think I can see the bright area of South Ray on the TV pan. It really stands out down there. But a really exciting station looks like it might be station 8 and we're really going to encourage you to scout around and see if you can get the samples of the dark layers that we see in (garble)

ORION (garble) of Stone Mountain is really something drastically lower than we are right now.

END OF TAPE

YOUNG The base of Dome Mountain it's really topographically lower than where we are right now.

CAPCOM Okay. And also on station 9 it may turn out to be difficult to find a pristine area. We'll let you scout around a little bit, pick your own station 9 or whatever looks like this gray material. And on the location of station 10 we'd like to put it just about where you said it might go as you were driving back yesterday. It sounds like the contact between the ray and the non ray material is just west of you there and we'd like to run the penetrometer ray along the contact but in the ray material, that is, the penetrometer ray would now go into northeast southwest direction and a double core would be something like 50 meters to the southwest of the deep core. Let me correct that a second before launch. Let me correct that. The double core will be about 50 meters towards the LM but along the contact so it'll be about 50 meters closer to the LM than the deep drill. And at station 10 quite a longer sampling time, we'd like you to sample on both sides of the ray, in other words, in the ray, along the line between the deep drill core and the LM and off the ray to the west.

YOUNG Okay, Houston I'm going to have to hold it open here for about and I think GARBLE (voice low).

CAPCOM Say again, John.

CAPCOM Okay, we've got a plan here at the end of the EVA to move it back. Do you think it will stay out of the sun until then?

YOUNG GARBLE Houston. Roll pitch and dover.

CAPCOM Go ahead.

DUKE Houston, you copy John, over.

CAPCOM We sure did there, Charlie, you copy us?

HONEYSUCKLE Orion, this is Honeysuckle. We have a

GARBLE with Houston at this time. Standby please.

DUKE Okay, Honeysuckle nice to talk to you.

How ya'll doing down there.

HONEYSUCKLE We're doing great, nice to talk to you.

YOUNG Right, sounds good.

HONEYSUCKLE Roger that will be pretty shortly GARBLE.

YOUNG GARBLE.

HONEYSUCKLE Say again John you are pretty poor quality

on this -

YOUNG I said GARBLE.

HONEYSUCKLE GARBLE. I'm sorry about this but the quality is very poor here.

YOUNG You're loud and clear.

HONEYSUCKLE I'm reading you a bit better now.

PAO This is Apollo Control Houston we've had a momentary dropout of some of our voice circuits.

YOUNG GARBLE.
HONEYSUCKLE All right, roger.
PAO So our Honeysuckle tracking station picked
up the ball and talked to John Young and Charlie Duke aboard
Orion. We're at 139 hours 54 minutes ground elapsed time.
CAPCOM Apollo 16, Houston.
HONEYSUCKLE Houston contact Honeysuckle net 1 and how
do you read?
CAPCOM Honeysuckle, Houston, loud and clear, how
do you read?
HONEYSUCKLE Houston contact Honeysuckle net 1 how do
you read?
HONEYSUCKLE ORION this is Honeysuckle we're still having
a little trouble with the incoming from Houston. We should get to
it first off very shortly for you, sorry about the delay.
CAPCOM Roger, thank you.
HONEYSUCKLE Okay, we're reading you this time for a
change.
YOUNG Okay, you guys are nice to talk to, we don't
care about Houston.
HONEYSUCKLE Well thanks very much. Certainly appreciate
it. It has been a pleasure working on this mission.
YOUNG Roger, we'd sure like to come down there and
see you folks, Dr. Silva, too.
HONEYSUCKLE Well, you've got a permanent invite, any
time you like.
YOUNG That's very nice.
HONEYSUCKLE We'll keep the beer cool for you.
YOUNG Honeysuckle (garble)
YOUNG You just got a couple of fellows to show
up on your log here.
DUKE That's the best idea I've heard all day.
HONEYSUCKLE I think there is a pretty good one down
here too.
YOUNG Is he in my terminology funneling
48 bags right now, the way I feel - I'd really love one.
CAPCOM Grant you that.
HONEYSUCKLE We too are having difficulty with the
COMM, Orion - hopefully very shortly we'll get a noun for you.
YOUNG Okay, pitch down to GARBLE 3
HONEYSUCKLE I don't know why Orion, we worry.
CAPCOM Got it Roy, Houston contact on 67 -
ORION Got her voice.
CAPCOM Roger, how do you read.
ORION Read you loud and clear now babe.
CAPCOM I read you fine.
ORION Roger we're checking on it together.
CAPCOM Roger.

APOLLO 16 MISSION COMMENTARY 4/22/72 7:30CST 139:48GET 515/3

PAO This is Apollo Control Houston further troubleshooting with the voice circuits emanating from the ground. The crew of Orion spoke further with Honeysuckle tracking station during this delay. We're at 139 hours 58 minutes ground elapsed time.

CAPCOM Honeysuckle contact Houston. Contact for OMNI COMM check.
HONEYSUCKLE Loud and clear. You can contact OMNI.
CAPCOM You are loud and clear also.

END OF TAPE

CAPCOM Orion, Houston.

ORION Go ahead.

CAPCOM Hey, upstanding. You're back.

ORION Yea, we go down below for a little while, and then we had a nice chat with Honeysuckle. They're mighty friendly folks down there.

CAPCOM Very good. Hey, during some of that, I was chatting away about EVA 2. I wonder if you got, how much of it you got. Did you get on through with station 10?

ORION No, we stopped at about station 8, Tony. Well actually you were talking about taking pictures of Stubby, as we go by station 7, and that was all.

CAPCOM Okay, fine. If you'd like, I can continue on with that.

ORION Okay, Tony. You did real fine on how we're going to have to do this. You guys are going to have to tell us when we get to a place, what you want done when we get there. There's no way we can remember and write it down.

CAPCOM Oh, I understand that, and we'll do all of it real time, but I just thought that you might have an overall plan before you get out.

ORION Damn good idea.

CAPCOM Okay. As you drive from station 6 to 8, we'd like for you to swing that back over and take pictures into Stubby, and all points to the south. And then we really going to stress station 8, because it maybe a chance to sample many of those material that Ken was able to see in south ray, so station 8 is a key station. Station 9, we're not at all sure that you'll be able, that we'll - that a nominal station 9 of the pristine area, so we'll just let you scout around and see if you can find the best you can. And station 10 will be longer.

ORION I just want to say, Tony. I guarantee we'll find a place inside of Trap or around. It's 3 or 4 kilometers away.

CAPCOM Okay, good show, and this station 10 will be 12 to 15 minutes longer now, and we'd still like it on a line between the deep core and the LM so it will be on a northeast line, and we'd like it in the ray that you described, but near enough to the edge so that you can sample off the west edge of the ray. Also we'd like you to pick up that particular basalt that you described underneath the engine belt.

ORION Okay. Hey, listen. This is a pretty good size. I don't know how big this ray is, but the sample on the west edge of it (garble). I don't understand how we're going to do that.

CAPCOM Where do you think that west edge was. Was it all the way back towards Spook?

ORION It's not that far, but I think, like if we go

ORION through west of the LM, we can go 300 meters, and we'll probably run into some really big boulders, which are probably the center of the Ray, and then they thin out a little off to the other side, from the Ray, I think we're in about three quarters from it, and it probably runs over that way for a good long ways.

CAPCOM John, the comm was bad enough, I didn't get all that. Maybe they got it in the back room back there, and we'll act on it reel time.

ORION Okay. What I'm saying is the Ray must be at 300 and, it could be meters wide, and we're probably on the east half of it.

CAPCOM When you get a chance up there, could you look out the window and see if the LRV battery covers are still open.

ORION Yea, they are both still open, Tony.

CAPCOM Okay, they are both still open.

ORION Well, in fact, well all three of them are open. Oh, that's right. John just reminded me the slow modes together, but they're all open anyway.

CAPCOM Okay.

ORION I think we're, I think we're (garbled) is't probably not but about a 4 or 5 degree right roll. (Garbled) to the sun or it wouldn't have been otherwise.

CAPCOM Right.

CAPCOM I have this block data here, if you want to take it sometime.

ORION Okay. Tony, in my opinion. That would be the sample edge of Ray (garble) maybe about 100 meters.

CAPCOM I'm sorry, John. The comm is real bad. Say it again, please.

ORION I said, it would probably be best to go east on it 10 meters and sample the edge of the Ray. We'd be closer to the edge.

ORION Okay, Tony. Give me 2 seconds and start going from the update.

CAPCOM Okay, the block data update. T35 142 plus 10 plus 51, T36 144 plus 09 plus 22, T37 146 plus 07 plus 53, T38 148 plus 06 plus 25, T39 150 plus 04 plus 57. Now that's it.

END OF TAPE

DUKE Okay, Tony, for some reason 34 REV 34 is flying. We did that last night and we didn't get it this morning. We started at 35 plus 42 plus 10 plus 51, 144 plus 09 plus 22, 146 plus 07 plus 53, 1 plus 48 plus 06 plus 25, 150 plus 04 plus 57, over.

CAPCOM Okay, the only one I have question on was T38 148 plus 06 plus 25.

DUKE That's it, Charlie, that's what I got.

CAPCOM Okay, good show.

DUKE Hey, is it Friday or Saturday now there?

CAPCOM You know, I had to think about that last night. In fact, I had to ask Kathy. It's Saturday.

DUKE Okay, thank you. Saturday morning?

CAPCOM Roger. It was nice humid but sunny morning when I came in.

DUKE Good show. What is your GET now?

CAPCOM Say that again, Charlie?

DUKE What is the present GET, over?

CAPCOM Okay, it's about 10 minutes away from the morning.

YOUNG GET ground elapsed time.

CAPCOM Oh, GET. It's 140 plus 10.

CAPCOM You'll have to excuse me, down here. I'm having to interpolate. The COMM is really bad.

DUKE (garble) was reading us pretty good.

CAPCOM Orion, Houston. Are you going to carry your pliers out with you?

DUKE Yeah, John's got them in his -- had them in his pocket last time.

CAPCOM Okay, good show. We may need that to work on the cosmic ray.

YOUNG Hey, Tony?

CAPCOM Go ahead, John.

YOUNG Did you hear what we said about the UV camera, over?

CAPCOM I got about the UV camera and we got a procedure already that we'd probably ask you to move it out of the -- or back to the north at the end of EVA-2. Do you think -- you don't think it will be in the sun before that do you?

YOUNG It depends on starting right now. The lense (garble).

CAPCOM Okay, we'd probably have you do it right away when you get out, then.

YOUNG Are you sure this is going to be anomaly on EVA-2?

CAPCOM Yes, it's anomaly in EVA-2 except the --

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CAPCOM with the exception for that I talked about.
DUKE Okay, we're jusg pulling your leg.
CAPCOM Ha! Ha! Ha!
YOUNG We're just pulling it real fine, Tony.
CAPCOM We're just going to have you rebuilt
ALSEP and the cosmic ray experiments, otherwise, it is normal
EVA.

YOUNG I thought we had changed --
DUKE If we eat all this meal, Tony, we aren't
going to be able to get our suits on.
PAO Apollo Control, Houston, now 140 hours
14 minutes. That was Charlie Duke again describing the
immense size of his breakfast.

END OF TAPE

DUKE Houston, 16.
CAPCOM Go ahead Charlie.
DUKE Hey Tony we're going to pick up EPP and try to get ahead going through this procedure. We're on 37 and the eat period we're going to takes up on 37. Do you want us to stop off there on 2?
CAPCOM Standby one.
DUKE And how do we look right now on your time line (garble).
CAPCOM Okay go ahead on 37 there and top off the PLSS 02 and say that last comment again.
DUKE Okay how do we -- how do we look on the time line we are just about through eating.
CAPCOM Okay standby one.
DUKE (garble) top off is it not?
CAPCOM Okay Charlie you're in good shape you look like you're about on it.
PAO This is Apollo Control, Houston, now 140 hours 32 minutes. That was Charlie Duke checking with Mission Control as to see how they looked on their time line for this morning's activities. The reply was "they're looking good. Right on time." We're at 140 hours 32 minutes and this Apollo Control, Houston.
YOUNG Charlie will be off comm for awhile.
CAPCOM Okay fine. And John if you have a minute you might consider attaching a lanyard to your APO on the perigee and attaching the lanyard to one of the fittings on the front of the suit so that if that head -- or that key comes out, you won't have to go looking for it.
CAPCOM But that's a crew reference whatever you think is necessary.
YOUNG Okay. (garble) lanyard so he doesn't get away from us.
DUKE What?
YOUNG Attach your lanyard (garble) doesn't get away from us.
DUKE (garble).
CAPCOM We just aim to please John.
YOUNG Say again.
CAPCOM We just aim to please John.
DUKE No we're not suppose to bring it back.
DUKE No. This (garble).
PAO This is Apollo Control Houston. 140 hours 37 minutes ground elapsed time. Our countdown clock in Mission Control, counting down now to time of cabin depress shows 2 hours 25 minutes remaining until time of cabin depress. At 140 hours 37 minutes ground elapsed time this is Apollo Control Houston.

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YOUNG
DUKE

(garble) Charlie.
(garble) 130 hours.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/22/72 CST 8:10 GET 140:38 520/1

YOUNG Okay, Houston. We're checking on LTV
now.
CAPCOM Roger, (garble).
ORION Houston, Orion.
CAPCOM Go ahead, Orion.
DUKE Right. We have the update of the EVA-2
(garble).
CAPCOM Orion, you are very garbled now. We don't
have the updates yet, I guess.
ORION Okay, we advise that we're starting to
put on our suits right now, over.
CAPCOM Roger.
PAO This is Apollo Control, Houston, in the
Mission Control (garble) Houston.
CAPCOM You should have all your updates, (garble).
We've gone on the room again and there's nothing coming up.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/22/72 CST 8:51A GET 141:09 MC-521/1

CAPCOM Madrid comm check, Houston, net 1 voice
check. How do you copy?
MADRID Madrid comm check, net 1. I read you
4 by 5, how me?
CAPCOM Roger, read you loud and clear, Madrid.
MADRID Roger.

END OF TAPE

APOLLO 16 MISSION COMMENTARY, 4/22/72 9:05CST 141:23GET 522/1

PAO This is Apollo Control at 141 hours 23 minutes. At Mission Control we are in the process of a shift handover. Flight Director Pete Frank and the EVA team coming on to replace the Gene Kranz team. Our spacecraft communicator on this shift will be Astronaut Tony England. And we have a clock counting down to the time of cabin depressurization shows 1 hours 38 minutes from now. The crew at the present time is in the midst of their EVA preparations.

MADRID Innate COMM check limit air-to-ground circuit.
CAPCOM Roger, Madrid this is Houston COMM TECH,
voice TECH how do you read?

MADRID I read you loud, with background noise.

CAPCOM Roger, Madrid.

ORION Okay, Houston, Orion, over.

CAPCOM Go ahead, Charlie.

ORION Okay, I've got my suit on and John's pulling
off COMMS to get his suit on.

CAPCOM Okay, very good.

ORION Okay, how we doing sound wise?

CAPCOM Standby 1.

END OF TAPE

CAPCOM Okay Charlie. In about 7 minutes you should be nominally be through suiting.

DUKE (garble) suiting in 7 minutes. We're going to be a little behind here.

CAPCOM That's okay you've got a good long day today.

DUKE Where does this 2 hours comes in Tony? Is that suppose to be at the end?

CAPCOM Rog. That'll be after the EVA.

DUKE Okay so we could (garble) and not affect our sleep period. Is that right?

PAO This is Apollo Control at 141 hours 39 minutes. We just a minute ago reacquired spacecraft, Casper. Ken Mattingly is in the midst of his sleep period at the present time. He has about 1 hour 20 minutes in that sleep period. And is essentially back on the flight plan. Yesterday at 118 hours 30 minutes we updated the clocks here in Mission Control and at the same time synchronized the clock aboard the Command Module to the updated time. That time update was 11 minutes 48 seconds. At 118 hours 30 minutes the clocks here in Mission Control and the clock aboard the Command Module were moved ahead to 118 hours 41 minutes 48 seconds. The clock aboard the Lunar Module Orion is not yet been updated with the new time and won't be until some-time prior to LM liftoff and the rendezvous sequence. Primary reason for this is that the crew on the Lunar surface is a little concerned with ground elapsed times. They will be of course concerned with the ground elapsed times when it becomes time to get back into synchronization with the Command Module and to get into orbit around the Moon. But while on the lunar surface they're primarily concerned with segment times with the elapsed times. The amount of time -- until an EVA the amount of time lapsed during an EVA and that sort of thing. And it has not been necessary at this point to update the clock in the Lunar Module, although for the flight planning purposes we are using the updated ground elapsed time. The principle reason for the time update for setting the clocks ahead in Mission Control and on the Command Module was as a result of the orbital changes resulting from the late lunar landing and the late circularization maneuver, which was performed by the Command Module. This changed the orbit about the Moon and got the orbit out of sequence with the flight plan so that Ken Mattingly was finding that his acquisition of signal times, his lose of signal times and the events in between primarily (garble) of opportunity and so on were not coming up at the same time that they were listed in

PAO the flight plan. The alternatives at this point are to do one of two things. Either to change all of the numbers in the flight plan all the way through or simply to change the clock and leave the flight plan as it is. And it has been a procedure for the last couple of missions to make the change simply by changing the clocks. This is the simpler thing to do. We just simply move the clock ahead to the point that it then agreed with the acquisition and lose of signal times in the flight plan. And as I said previously at the appropriate time, the Lunar Module clocks will also be sync to this new time. We now show one hour 20 minutes until cabin depressurization, just prior to the start of the EVA. Based on yesterday's experience we'd expect that the EVA -- the crew would begin getting out of the Lunar Module and down to the lunar surface roughly 10 minutes after we start the cabin depressurization. A short while ago Flight Director, Gene Krantz, who is still on the console, checked with the LM's systems engineer for a status report on the Lunar Module Orion and the report was that the LM looks very good this morning. The manned space flight network station, which will be covering most of the extra-vehicular activity, will be the station at Madrid, Spain. The station uses an 85 foot diameter dish antenna. At about 148 hours into the mission, which will be a good way through the EVA, we will begin to get coverage from the 210 foot dish antenna at Goldstone, California.

END OF TAPE

PAO This is Apollo Control at 141 hours 46 minutes
We'd like to correct 1 portion of a previous statement, that is
in regard to the flight plan for Casper. Mattingly is, indeed,
back on the original flight plan. However that plan calls for
him to be awake at this time and we have just put in a call to
the command module. Capsule communicator Hank Hartsfield called
Mattingly to see that he was awake. Mattingly came back with
a cheery good morning and he'll be going through his wakeup
routine - primarily getting something to eat and then getting
ready for a busy days activities in lunar orbit. The flight
director for the Command Module, Casper is again Don Puddy.
Casper now in it's 35th revolution of the moon, having just
come around the front side and moving toward the Descartes site.

ORION Okay, Houston I'm through with it.
CAPCOM Okay, John.
ORION Returning to our 5th step on EVA two.
ORION Okay, Houston, Charlie, (Garble) is 211 18.
CAPCOM Okay, 211 18.
ORION Mine is 220 54 56.
ORION Duke did you want to go to normal voice till
after you've got the checklist.
CAPCOM Standby one.
ORION You want us to go to normal voice?
ORION Okay.
CAPCOM No, we'd like to stay down voice backup.
ORION Roger, down voice backup. BIOMED to ground.
CAPCOM And, John, Houston.
ORION Go ahead, over.
CAPCOM Okay, I got this result on the quick look
on the X-ray. I just thought I'd pass it up to you. The
Descartes area is higher in aluminum silicon than mare but it's
not as high as the highland heat for Smythii.
ORION Well, we can't win here.
CAPCOM You're right.
ORION Okay, I think we'll be staying at the backside
of the moon after this. Hang in there, Charlie, do you think
it'll last?
CAPCOM Okay.

END OF TAPE

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ORION Okay, Houston. We're down to PLSS donning.
CAPCOM Okay, and you're right back on the time line.
ORION (Garbled) Yea, there's a little slack in
there, but we took care of it.
CAPCOM Okay.
PAO This is Apollo Control. Through the rather
noisy communications, that sounded like John Young, reporting
that he and Charlie Duke are now getting into their portable
life support systems, and based on our experience yesterday, we
found that the communications improved noticeably when they got
on the communication unit in the portable life support system,
and a mode in which their communication is relayed through the
lunar module. As mentioned previously we are receiving the
spacecraft on earth through the 85 foot DISH antenna at Madrid,
Spain. And a good way through the EVA, at 148 hours approximately,
we'll begin getting coverage from the 210 foot DISH at Goldstone,
California. Our best estimate at the present time is that the
crew will be ready to get out of the lunar module at 143 hours
15 minutes, or about 1 hour 15 minutes from now. The command
module, Casper, is presently in an orbit 55.5 by 64 nautical miles.
Ken Mattingly is up and about, getting ready for an active day of
orbital experiments and photography.

END OF TAPE

YOUNG Tony, how do you read?
CAPCOM Houston, Orion, over. Go ahead Orion.
ORION We're going ready for the PLSS COMM checks,
over.
CAPCOM Roger.
CAPCOM Orion, this is Houston you standby one minute
please.
ORION GARBLE.
CAPCOM Orion, Houston go.
ORION Yeah, we want to know if we can do the
PLSS COMM checks or the PLSS data either that or the call to
standby sounded like GARBLE.
CAPCOM Standby one.
ORION Okay.
CAPCOM Go ahead Orion.
ORION Go ahead, over.
CAPCOM Orion this is Houston, you called.
ORION Yes, we thought you were calling us. We
got a call from somebody that sounded like Mike standby on
the comm check.
CAPCOM Okay, fine.
ORION What do you mean Antonio, are we go for
the COMM check?
CAPCOM Yes, we're go for the COMM check.
ORION Okay. Okay, audio LMP, S-band is GR, RCS
is DI. GARBLE. VHF A to PI and B to receive.
ORION A to PI, B to receive GARBLE.
ORION Okay, at pen here is the second thing that
goes in there remember you copied last night.
ORION Okay. S-band PN to PN.
ORION No. Negative. GARBLE.
ORION I got all that.
ORION PWA secondary.
ORION Yeah.
ORION Down voice backup.
ORION Yep.
ORION PTM to PTM.
ORION Yeah.
ORION Ranging to OFF.
ORION Yep.
ORION Okay.
ORION GHF GARBLE.
ORION No.
ORION A receiver on
ORION No.
ORION B receiver to OFF.
ORION No.
ORION B receiver to ON.
ORION No.

ORION Wait a minute, B transmitter OFF, B to zero.
ORION I got that.
ORION Why don't you revolve into let?
ORION Okay, this will give you GARBLE. GARBLE
APR been received. Okay.
ORION I get you Charlie. Got it.
ORION In lock.
ORION Okay, audio closed GARBLE. GARBLE verified.
If we do it right the first time. PLSS mode LSGA GARBLE.
Sonar SYG. GARBLE GARBLE. Charlie, and that's about it.
ORION It's about 94.
ORION Okay. GARBLE with Houston. Okay, how do
you read, Houston?
CAPCOM Okay, we copy it Charlie, you've got a lot
cf hash in the background but we can make you out about like
yesterday.
ORION Okay GARBLE to flyby and your super. We
are going to get John, John up now, commander audio, open.
ORION It's open.
ORION Can't except anymore.
ORION Go to GARBLE. GARBLE.
ORION Okay, can you get the LTG up.
ORION Yeah.
ORION Okay, power on.
ORION Okay, inside.
ORION GARBLE.
ORION GARBLE.
ORION to 25.
ORION Okay.
ORION GARBLE.
ORION Okay. GARBLE comm check yet somebody GARBLE.
ORION Houston GARBLE over.
CAPCOM Okay, we hear you. There is a lot of noise
in the background.
ORION Okay sun's coming up.
PAO This is Apollo Control at 142 hours 22 minutes
and we're experiencing the same sort of noisy communications
we did yesterday at the beginning of the first EVA or during
the EVA preparation. While the crew is still using the LM as
the relay from the Portable Life Support System. Once we go
on the lunar communications relay unit using the high gain and
the low gain antennas instead of the LM omni-directional
antenna we should see the same sort of a marked improvement in
the communications that we did on the first EVA. There will be
an informal briefing in about 15 minutes in the MSC news center
briefing room on orbital science. That again is a briefing in
about 15 minutes in the MSC news center briefing room and the
subject will be the orbital science being performed by the

APOLLO 16 MISSION COMMENTARY 4/22/72 954CST 142:12GET 526/3

Command and Service Module, Ken Mattingly aboard Casper. We have an updated time of egress, time that the crew will be getting out of the Lunar Module, Orion, on the lunar surface. It looks as if from the progress they are making in the checklist at the present time that they will be getting out about 15 minutes earlier than we had previously estimated. That new egress time again an estimate is about 143 hours or about 37 minutes from now.

ORION

Okay, you get GARBLE to egress GARBLE.

ORION

Okay, that's fine.

ORION

Okay -

END OF TAPE

YOUNG Yes that is, no, that is push cap.
 DUKE (garble).
 YOUNG Okay.
 DUKE Can't return to EGRESS.
 DUKE No.
 YOUNG (garble) release to AUTO.
 DUKE No.
 YOUNG (garble)
 DUKE Yes. (garble).
 YOUNG Yes.
 DUKE Okay. (garble). Okay.
 YOUNG (garble).
 DUKE Okay.
 YOUNG (garble) first.
 DUKE Okay. (garble).
 YOUNG (garble). The end connect, the hose (garble).
 DUKE Okay.
 YOUNG (garble). That's yours first.
 DUKE Okay. MA (garble).
 YOUNG (garble) CO negative.
 DUKE Okay. I need the purge valve.
 YOUNG Purge valve? I needed it a long time
 ago.
 DUKE (garble).
 YOUNG (garble) thing. That may be a good idea.
 DUKE Good. Verify lock being closed lock
 being in and low close.
 YOUNG (garble). That low close? Low close mode
 I should say.
 DUKE (garble) purge valve is vertical. Okay you
 got it?
 YOUNG Okay. (garble)
 YOUNG Get your perigee valve out then I'll
 (garble).
 DUKE All right.
 YOUNG (garble). Hold that.
 DUKE (garble). Got it.
 YOUNG Looks pretty clean Charlie. You're better
 than you were yesterday.
 DUKE (garble) coming up.
 YOUNG I'm sure your's was (garble).
 DUKE How flow.
 YOUNG Blocked.
 DUKE A little bit anyway.
 YOUNG I'm going to clock this outboard again,
 Charlie
 DUKE Okay fine.
 YOUNG (garble).
 DUKE (the outboard clutch) It'll have to come way up.
 YOUNG That's all right, do that.
 DUKE Is that all right?
 YOUNG Yes.

YOUNG Okay. Wait a minute.
DUKE Okay that's in and lock block, it's
right up here. Okay.
YOUNG Okay.
DUKE Now (garble).
YOUNG Yes.
DUKE Okay we've done that. Let's take a
drink of hot water.
YOUNG Yep.
DUKE (slurp, slurp)
YOUNG Got to have another shot of water too.
(garble) (BTU turn around) in the water because the water (garble). There
we go.
DUKE Man my hands are black already. (garble).
YOUNG You going to take some more of those (garble)
you want to?
DUKE No I've got plenty.
YOUNG Okay.
DUKE (garble) The doors coming off - (garble)
YOUNG Okay.
YOUNG There we go. (garble).
DUKE Okay we're back to here to position Mike
again.
YOUNG (garble) we've already done that.
DUKE Okay. This fan is on.
YOUNG This fan is geared.
DUKE This fan is on.
YOUNG (garble) midnight position.
DUKE Okay. You get your's first.
YOUNG Good.
DUKE The drink bank is in.
DUKE Okay. (garble) is good. (garble).
YOUNG (garble).
DUKE It did. Super.
YOUNG Oh it's beautiful.
DUKE How about that? The first time.
YOUNG Okay. Here we go.
DUKE (garble) now if we can get back here.
Turn around. Hey John?
YOUNG Okay Charlie let me get this (garble)
up on your --
DUKE That thing again?
YOUNG Yea. Check it around.
DUKE All right.
YOUNG Got it. That will keep it from getting
in there.
DUKE Easy. Can't understand where I got that
white tape on the outside of my window (laugh).
YOUNG Maybe somebody on a binge no doubt.
DUKE Okay.

YOUNG Wait a minute. There you go. Wait a
minute (garble).
DUKE You can't get on the LM (garble). up there.
YOUNG Hear a (garble)
DUKE (garble). I don't hear any at all.
YOUNG (garble) wait a minute.
DUKE (garble). Take it off, it's not blocking it
at all.
YOUNG (garble).
DUKE Yea it's right back here.
YOUNG (garble) Yea, I could get a it down back here.
DUKE Yea.
CAPCOM And you're doing fine up there. You're
about 15 minutes ahead.
DUKE Roger. Thank you.
YOUNG Now that ought to do it. I got it
Charlie (garble).
DUKE It's locked, great.
YOUNG Let go (garble). Charlie I want to get this
(garble). Its down good Charlie. Okay.
DUKE Okay, how much was done to check the bag
and harness protective visors.
YOUNG (garble). Harness down (garble) drop it
(garble)
DUKE Okay.
YOUNG Your 2 harness is on the floor.
DUKE My 2 harness is on the floor?
You're kidding?
YOUNG No.

END OF TAPE

ORION Okay, can you turn around.
ORION Yea.
ORION The other way, Charlie.
ORION Okay, if you'll give me one side to hold
for you.
ORION Okay, the other side will go to hold.
ORION Okay.
ORION Hold that thing.
ORION I missed it.
ORION Okay, just hold your dock by the strap, there.
ORION I can't see it, okay.
ORION Just hold it now, there now pull it.
ORION Okay, again.
ORION I can't -
ORION If I squat down would it help?
ORION No.
ORION Yea, maybe it would.
ORION Okay, Charlie. Hey, I've got it, the pan on.
ORION Okay.
ORION How about a shot of liquid water while your,
take you another moment to get you there. There you go. Hit it.
CAPCOM John, Houston.
ORION Go ahead over.
CAPCOM Okay, we understand you put your PURGE valves
in so that the (garble) out bound. Are you pretty confident you
can operate it without that.
ORION Yea.
CAPCOM Okay, fine.
ORION Yea, Charlie, if you'll turn sideways, no that
wont slow it down. It is.
ORION The audio snaps up there.
ORION Did you just pull it loose.
ORION No.
ORION The, turn around again.
ORION Can't go much farther. I'm wrapped up in my
water hose. (garble)
ORION It has to be routed underneath here.
ORION Okay, why don't you come do the bottom and
leave it like it is, and undo the bottom and take it up real loosely
at the bottom. It wont stay like it is?
ORION I've got it, Charlie.
ORION Okay.
ORION Okay, Charlie. Just stand up now.
ORION I'm against the roof.
ORION Okay.
ORION All set?
ORION Got it. And we'll spin around to the left.
Give me another shot of water.

ORION Where are we getting it?
ORION I don't know, on (garble)
ORION Okay.
ORION Okay, now we're ready. Just as soon as we
get this water we'll go on. Right now we've got to hook up to
the leader straps.
ORION Okay.
ORION Okay.
ORION Okay.
ORION Okay. 4 turns and we're down to turn the pump.
ORION Okay, disconnected water.
ORION While I'm around here, we'll check my circuit
breaker configuration.
ORION You to, Charlie.
ORION Yea, check mine.
ORION Phase configuration looks good too.
ORION Okay.
ORION Okay, verify the power.
ORION No, I'm not that far yet. You've got to hook
up the water.
ORION If you bring it around this way, you'd be better,
John.
ORION Okay.
ORION Okay.
ORION On your way now?
ORION No, somethings got me back there.
ORION (garble) on comm a little bit, Charlie.
ORION Yea, I know it.
ORION (garble)
ORION Got it?
ORION Yea.
ORION Okay, fine then. Hoses. Okay, and we'll move
yours back to the pack. Okay, Charlie. I'd like to get your, I'd
like to get the strap a little better on you.
ORION Which one, (garble)
ORION I've got it. (garble)
ORION Want to secure your hoses up there.
ORION Okay.
ORION There we go. That's great.
ORION Okay, and the (garble) breakers are verified.
Now, okay, now we got to hook some water. Isn't much cooler out
there. Got yours? Okay, yours in and locked.
ORION It didn't lock, Charlie.
ORION Okay, thank you.
ORION Okay, verify the following locked. (garble)
is in line and adjusted.
ORION No.
ORION That feels good.

ORION 02 connectors 3 locked.
ORION Go.
ORION locked. Check that. PURGE valve 1 locked. 820 connectors
ORION Go.
ORION CB's. Connectors locked. Okay, we verified the for
ORION Go ahead.
ORION Turn the page. Turn the page, theres (garble).
ORION (garble) block of 4 and close (garble) systems.
ORION Sure kind of weak.
ORION (garble) if we're dividing 021 off.
ORION Yea. (garble)
ORION (Garbled and heavy background noise.)

END OF TAPE.

ORION (garble) looking good.
ORION I guess you got to go in the bottom,
Charlie.
PAO This is Apollo Control at 142 hours
44 minutes. Duke and Young at the present time are com-
pleting their suit integrity checks. Following that we will
begin the cabin depressurization. That should occur a little
less than 5 minutes from now. And we're still holding to
our Egress time, the time the hatch is opened and the crew
heads for the lunar surface at 143 hours even, which would
be about 6 minutes from now. Flight Director Pete Frank
has gone around the room and checked each of his Flight
Controllers and we are GO for Cabin Depressurization and
Egress for the second Extra Vehicular Activity.
ORION (garble)
ORION Sorry, Charlie. (garble) sounds pretty good.
Put that down good (garble) Okay, these old gloves are on.
Okay, pressure integrity trimmed (garble)
ORION Okay, pumps going on. Pumps on.
Put A, B and E to Egress.
ORION Read the integrity check for me.
ORION Okay, K minus in egress both of them in Egress
ORION Okay. Don't do (garble)
ORION Okay. Press (garble) clear at 31 to 34.
ORION Okay.
ORION Update 37 to 40 and 02 (garble)
ORION Okay, I'm coming up.
ORION I fel good.
ORION I can get that valve myself right here.
ORION See that?
ORION They're down, that's the purge valve.
ORION Oh, good.
ORION Okay, we're in hold at 385
ORION I'm 385.
ORION Okay, purge valve 2 to OFF and monitor
cupgate for 1 mlnute.
ORION Get mine John. I can't quite reach it.
ORION Okay, Houston. I'm going to abide by
1 minute pressure decay check on me.
CAPCOM Okay, fine. We're timing.
ORION Ready. Mark.
ORION For once, I have my drink bag in the
right position, it's not leaking.
ORION Tony, we'd like to change our calls
for pig pen 1 and pig pen 2.
CAPCOM We thought about that last night and
your 1 minute's up.
ORION (garble) At least I can reach yours.

ORION Okay, mine decayed about .2, actually it was a little less than .02 because I ran it for about a minute and 20.

ORION Okay, mine was less than .2, about 1-1/2. okay, would you turn my oxygen on. Please, John.

ORION Yours is on.

CAPCOM Okay, we copy.

ORION Okay, it's back on Charlie.

ORION Okay. (garble)

ORION Yes. Confirmed go for depress from Houston.

ORION Okay, Houston we're backed up and we're requesting a GO for DEPRESS.

CAPCOM Okay, you're GO.

ORION Okay, 16 cabin repress to open

ORION Get in the right position here, okay.

ORION Trying to get out of your way.

ORION That would be great.

ORION Good. Okay, go ahead.

ORION Cabin repress valve to closed

overhead abort dump valve open in AUTO.

PAO This is Apollo Control at 142 hours

51 minutes. The crew at the present time beginning to depressurize the lunar module in preparation for opening the hatch and descending to the surface at Descartes. I would like to run over briefly some of the objectives of this Extra Vehicular Activity. The prime objective will be to get to Stone Mountain. This is a mountain, which is about 1660 feet or so above the site at Descartes, where the LM landed. They will hope to get about 750 feet, around 250 meters up on the site of this mountain, and hopefully will be able to sample the terraces that have been observed in the photography of this mountain, and which the crew has also reported seeing out the window of the lunar module seen from the surface. It's believed that these terraces may be related to volcanic flows, lava flows and these lava flows are called the Descartes formation. They do differ from the Cayley plain area which the crew was sampling in the EVA yesterday. They will also, at station 8, be sampling ejecta from South Ray Crater and at this point we expect to see many large blocks, blocky ejecta from that crater. They'll be running experiments on these blocks to help date the blocks and determine when the blocks were layed down on the lunar surface and by inference, to get a time at which South Ray Crater was formed. Also, because of the interesting magnetometer readings that were obtained yesterday, we expect a magnetometer to be added at Station 4 or Station 5 on Stone Mountain. One thing that we'll probably observe on this EVA are a large number of blocks, some of them perhaps up to 10 or 20 feet across. And we're now at 142 hours 52 minutes. We have gotten the

PAO cabin pressure down to the 3.5 pounds per square inch and have started the portable life support system clock and that clock started at 7 hours and will count down toward zero, the planned time for this Extra Vehicular Activity. We are now showing 6 hours 58 minutes and 20 seconds and counting downward on that clock. The EVA, as far as our timing purposes in Mission Control go, began 1 minute 50 seconds ago.

END OF TAPE

ORION Okay.
PAO It will be several minutes before the cabin is depressurized, however, to the point that the crew will be able to open the hatch and actually descend to the lunar surface.
DUKE There it is.
YOUNG Man, it's going out to us and everything. I'll tell you why you can't open it on account of this air behind us.
DUKE You could tell that. Look at the particles blowing out of here.
YOUNG I had a (garble) third out.
DUKE Got it?
YOUNG You did a pretty good job with that.
DUKE Hey, John. We going to have to turn around and get over and make to your circuit breaker panel for me to get any water or, on or anything.
YOUNG Okay.
YOUNG Which way?
DUKE Turn to your right.
YOUNG Can't you get it?
DUKE Well, I can, but there aren't --
YOUNG Okay, it's on. Let me get yours.
YOUNG Can you reach it?
DUKE Bet the hatch won't shut.
YOUNG Want me to turn around?
DUKE Sure, go ahead. Right now.
YOUNG Okay, there we go.
YOUNG Are you ready to go?
DUKE Not much more. I'm getting to feel it.
YOUNG There you are.
DUKE Okay, the water is on.
YOUNG But it's hot.
DUKE Okay. Turn back around I think, hope
YOUNG No.
DUKE Okay, let me have the hatch?
DUKE Okay. Going hand me the (garble).
DUKE When you get out on the porch, I'll hand you everything, okay?
YOUNG All right.
YOUNG Okay, I don't have any blacks. That thing must be worth like half --
DUKE (garble) the water flag.
YOUNG I can see it, yours is subremaining.
DUKE You can really see it.
YOUNG Well, you can see some ice building up back there

YOUNG and --
 DUKE I'm getting good cool and I can feel it.
 YOUNG Yeah, so di I.
 DUKE Feel it go.
 YOUNG Okay. Let's go.
 DUKE Okay, Houston, we're going to get out.
 CAPCOM Okay. We understand your water flags
 are cleared.
 DUKE That's correct. John did a (garble) but
 I feel good good cooling.
 YOUNG Backup ahead?
 DUKE No.
 CAPCOM Okay, John. Your go for egress. Charlie,
 we'd like you to stand --
 DUKE Okay, mine has just pushed --
 CAPCOM Okay, fine. You both go for egress.
 YOUNG Holy cow.
 DUKE Okay, John, you're doing great. Got to
 come toward me a little bit. There you go.
 DUKE Okay, you've got -- point your rear end
 towards me. There you go. Now can you put throughout the
 door? Bend over a little bit so that you don't catch your
 harness. There you go.
 YOUNG Okay.
 YOUNG Okay, Charlie, hand me the jet bag?
 DUKE Okay, standby.
 YOUNG Is the (garble) lit?
 DUKE Yeah.
 YOUNG It can't hurt the strap.
 DUKE No.
 YOUNG Okay, here's the EPD.
 DUKE Okay.
 YOUNG I don't want to pull too hard (garble).
 DUKE Okay.
 YOUNG There we go, (garble).
 YOUNG Okay, the recorders are on, (garble),
 utility is plugged.
 DUKE Okay. Get the plugs on?
 DUKE (garble).
 DUKE The degrees look okay.
 YOUNG Coming over to this side. I think.
 DUKE Let me go.
 DUKE Okay, handsome, what do you want to do
 with the camera?
 CAPCOM Okay. We'd like you to go over and describe
 to us where the sun is with respect to the UV.
 YOUNG I could've done that standing in the vehicle.

CAPCOM Well, we're going to have to move it back,
but we just wanted the data before you went ahead.

YOUNG Charlie, watch out for there's a big rock
in the foot pad.

DUKE Yeah, I know it. I put it there. That's
on in duty.

YOUNG Charlie, is my visor down? I can't --

DUKE What time is it?

YOUNG Never mind, never mind.

DUKE You're protective one, I don't know about you.

YOUNG Okay, I got them both down. Another one.

DUKE You get minus L?

DUKE Okay, Houston, I'm out on the porch.

CAPCOM Okay, Charlie.

DUKE Okay, got to go back and close the slack.

YOUNG Okay, the time is just -- is just ready,
the sun is -- it's slicing off for about -- slicing off two and a
half to three inches of the, (garble) it's slicing off half of the
image with the spectra box. You know what I mean?

CAPCOM Okay.

DUKE It slices right across here.

CAPCOM Okay, the sun is on the film cassette,
is that right?

YOUNG It is on the spectroscope. The spectroscope
(garble) that hooks out but the obstacle course --

CAPCOM Okay, we'd like you to move the UV camera.
I am in the east direction, directly east, so that it's one foot
behind the plus Z pad. Reset before you move it.

YOUNG Okay.

YOUNG Okay, Tony, I'm on the old lunar terrain
again. Can you read that?

CAPCOM Very good. Okay, did you do a reset that
move the camera and the east direction until it's 1 foot
behind a line that goes northsouth through the plus Z foot pad.

YOUNG Okay.

PAO John Young is being asked to move the forward
UV camera in order to it out of the sun. Yesterday, Young also
reported, when he set the camera to desired position, it was,
rather than pointing at the proper area of the sky, it was pointed
at the lunar module porch. This should also help that sort
of a problem.

YOUNG Man, that thing really plots open.

DUKE Okay, Houston, she's moving.

CAPCOM Okay, read level up there, and then we're
going to give you target to aim at the earth -- settings for
aiming at the earth.

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YOUNG Houston, this really isn't too very good for me to do that because I can't get my strap back between it and egress the (garble). Anybody try this and gave it a whirl?

CAPCOM Negative, John. If you have to move south a little bit, it's safe to move to the edge of that shadow.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/22/72 10:45CST, 143:03GET 531/1

CAPCOM Negative, John. If you have to move it south a little bit, it's safe to move it to the edge of that shadow.

YOUNG Okay, let me do that. Three more now and we're going to lose whatever we're doing here.

CAPCOM Okay, that's fine. We understand.

DUKE Hey, John, that's better. I move the mesa back down and it's slanted super nitrate.

YOUNG GARBLE.

DUKE PSR C-1 is open. I'll tell you what we'll do Tony, we'll bring up the TV for you.

CAPCOM Okay, when you push in the circuit breakers would you read us the battery temperatures.

DUKE Okay, the yaw, okay all the breakers are going in. And the battery is in so 165 and the other is 82.

CAPCOM Charlie Duke now preparing to turn on the television.

CAPCOM Okay, 70 and 82.

DUKE Okay, what's next for the TV?

CAPCOM Say again Charlie.

DUKE What is the next GARBLE setting for the TV. It's not on my checklist.

CAPCOM Okay, on the crew search, mode 1.

DUKE Okay, go ahead.

CAPCOM Okay, position TV horizontal and counter-clockwise to stop.

DUKE Okay, go ahead.

YOUNG Okay, Houston that camera is releveled. Camera is releveled, Jim.

CAPCOM Okay, John, we'd like you to -

YOUNG GARBLE.

CAPCOM We'd like you to aim it at the earth. The azimuth is 058, elevation is 75.

YOUNG Roger.

DUKE Okay, Tony what else on this TV list.

CAPCOM Okay, just go to mode 3 on that and we'll leave it there. And we'll control it from here.

DUKE Okay, will you have a picture. Okay.

CAPCOM Okay, John with those - that azimuth in elevation look through the earth site and center it on the earth, then give us the azimuth you are reading and from that we'll calculate a new target.

YOUNG Okay, yaw is just about dead center Tony in the plack A.

CAPCOM Okay, fine.

DUKE You ought to be getting a picture.

CAPCOM Okay, and Charlie go external on the crew switch.

DUKE What was the elevation setting, Tony?
CAPCOM Okay, the elevation is 75.
PAO John Young is pointing the 4UV camera at earth. Charlie Duke is getting ready to switch on the lunar communications relay unit which should greatly improve our voice communications and also give us television.
YOUNG There, now that takes care of GARBLE.
DUKE Okay, your power is up to 4 Tony, I mean your S-band ATC support and your external it was off, I'm sorry.
PAO We've got black and white picture. We should have the color converted shortly.
PAO The lunar surface temperature in the sun should be around 135 degrees today.
YOUNG Okay, Houston the earth is in the center and the cameras read level.
CAPCOM Okay, would you read off the azimuth now?
YOUNG I left the azimuth on there and leveled the camera and put the earth in the center. How's that?
CAPCOM Okay, that sounds fine and the azimuth is 058.
YOUNG 058 76.
CAPCOM Okay, then the first target will be 112 and 40.
YOUNG 112 and 40. You want to do a reset after we get to that target, right?
CAPCOM That would be fine. And when you do a reset verify the film advances and read the tempa label for us.
YOUNG Okay, that's the tempal label on the film cassette. Roger.
DUKE That's going to be pointing right at the Lunar Module, Houston.
CAPCOM Okay, then move it to the left until it is clear of it.
DUKE GARBLE.
CAPCOM Move it in azimuth.
YOUNG You want me to move it to the left until it's clear, but I've got to take it out the other side of the vehicle.
CAPCOM Move it in azimuth, not the camera.
YOUNG Okay. Thank goodness you said that - I was about to pick this thing up.
CAPCOM Sorry about that, John.
YOUNG There's no way to get that out GARBLE.
PAO This is Apollo Control we expect to spend about 50 minutes here at the lunar module before moving on to station 4. We can see Charlie Duke working at the lunar roving vehicle, getting the vehicle loaded up and ready for the traverse, getting the sample box on and equipment loaded, and in the background to the left John Young working on the UV camera.

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YOUNG
CAPCOM
YOUNG

Okay, Houston I think we're clear now.
Okay, good show, hit reset, watch the film.
GARBLE. Okay, but it's reading 080, Houston.

END OF TAPE

YOUNG (garble) 080, Houston.
YOUNG Is that okay?
CAPCOM Standby a second John. Why don't you read that (garble) label to us?
YOUNG On the battery?
CAPCOM No that's on the film cassette.
YOUNG Okay. The TEMP label on the film cassette is black at a 100 degrees (garble).
CAPCOM Good show. That's good news. I hate to do this to you John, but we're going to have to change targets. We'd like to go the azimuth 317.
YOUNG Okay 317.
PAO That lunar surface temperature we gave at 130, 135 degrees fahrenheit is in the sun. In the shade the temperature would again be about minus 100 to minus 150 degrees fahrenheit. That would be in the shadow of the Lunar Module or in the bottom of a crater that was shadowed.
DUKE Okay 317 at 51.
CAPCOM Okay hit reset and watch the film, if it advances we're through with it for now.
YOUNG Oh boy, did it advance over 120 -- it's like almost 180 --
CAPCOM Good show. That's the way it should go. Now we'd like to turn around and look at the cosmic ray for a second.
YOUNG Okay. Turn around and look at the cosmic ray. Turn around and look at the cosmic ray.
DUKE It's a nice cosmic ray.
CAPCOM Okay In the top panel
DUKE We're just ---
CAPCOM In the top panel when you pull that ring --
(LAUGH)
CAPCOM A piece of tin foil should of slid up so that there's only a 2 by 2 flap in the upper left hand corner. Can you see that tin foil?
YOUNG There's only a 2 by 2 flap in the upper left hand corner. Yeah, but it's more than a 2 by 2 it's about there's a hole that's covered up -- there's a hole up there and it's covered up in the upper left hand corner, or almost covered up.
CAPCOM Okay understand that -- that should be right.
YOUNG It's almost covered up.
CAPCOM Could you describe how it's almost covered up? Which part isn't covered?
YOUNG The bottom part of the hole is almost uncovered. The bottom one -- I'd say the bottom -- 1/4 of the hole is not covered.

CAPCOM Okay that's good news John. That means
it deployed fine. We'll get a picture of it later from
Charlie and you can go about your normal work now.

YOUNG Oh the old water bag is working super.
This is going to be a good day, Charlie.

DUKE Good.

YOUNG Ah the old commander's camera. Right
down in the old dust.

DUKE That's on the floorboard that's not in on
the ground.

DUKE Okay.

YOUNG I wonder what my normal work load is at
this point.

DUKE I don't know.

YOUNG We're suppose to be at station 4 Charlie.

DUKE Just like in training John I --

YOUNG Yeah.

DUKE I'm linking the water to orange juice.

YOUNG Open my visor.

CAPCOM And Charlie when you're taking that pan
let me know. I have another picture for you.

DUKE All righty.

YOUNG Okay Charlie hold still a second let
me get your (garble) strap tied down on here a little bit.

DUKE (garble).

YOUNG That's really bad there.

YOUNG I didn't know a grown boy could get his
straps so messed up in one little EVA.

DUKE Oh, the hell with dark slide. Coming out.
There goes one picture. Okay.

YOUNG You got the EVB right.

DUKE Yes, just about finished with it.

YOUNG You got the LRB circuit breakers plus
A, B, C, D, and (garble) closed?

DUKE Yes -- no I didn't close (garble).

YOUNG Okay, the (garble) button is on the lacrew.

DUKE It is? Amazing.

YOUNG Close LRV cover and press tight. Okay
Houston the covers are still open and they don't have any
more dust on them than they did yesterday.

CAPCOM Outstanding.

YOUNG How far do you have to dust?

DUKE What we need is a dust brush for the
dust brush.

CAPCOM Don't say it Charlie.

DUKE Say again.

CAPCOM I said don't suggest it.

YOUNG Yeah. Somebody probably like that.
 DUKE I was just kidding you guys. What we need is less velcro. Man, Tony yesterday when that piece of velcro -- Hey can you see guys see that dust on there with the TV?
 CAPCOM We're not looking down far enough right now.
 DUKE Oh. John make sure that I did the (garble). The APP is empty and magazine lema is on the camera 500 and in with all the other film stowed.
 YOUNG Okay down and press tight.
 CAPCOM Okay.
 DUKE Man that LPM is a bucket of spaghetti.
 YOUNG Not messing with it are you?
 DUKE No I was just -- as near as I can figure out Tony what we've got to do now is load up the PLSS's and go get them. Want me to reset the far UV again or you just want to be happy with this one? All we got do now is a PLSS loadup.
 CAPCOM Okay yes. We have one more target on it. I'm not sure they have enough time and hold on.
 DUKE Wait a minute I got to get a pen John.
 YOUNG It'll be a few minutes.
 DUKE Why don't you run out and pick up a rock.
 YOUNG Hey outstanding suggestion. Give me a rock bag, Charlie.
 DUKE The little ones or the big ones?
 YOUNG Huh?
 DUKE Why don't you take your camera.
 YOUNG I will. (garble).
 DUKE Okay (garble).
 YOUNG That's your's huh?
 DUKE Yes. Well I got some right here. You use those and I'll put the old maps - Which way are we going today?
 CAPCOM How about south?
 DUKE The Hadley Rille.
 CAPCOM Okay --
 DUKE (garble) started training building.
 (LAUGH)
 CAPCOM Okay verify that your PLSS antennas are up and could we have an EMU check first chance? And John if you're out picking up rocks you might --
 DUKE (garble). How's the Comm?
 CAPCOM COM sounds good.
 DUKE Maybe we ought to leave them down. That way we won't break them off.
 CAPCOM And John if you're picking a rock could you get that --
 DUKE (garble).

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CAPCOM (garble) underneath the engine (garble)?

YOUNG Yeah. Sure could do that.

DUKE Tony, that's a double mulley -- that rock.

CAPCOM Uh Oh.

DUKE Come here John let me get you're antenna.

No I can't reach it. Why don't you get down slope and lay it on the Rover. There we go. Camera's on isn't it?

Guess what? The antenna's up and the com is still the same.

YOUNG (garble).

CAPCOM (garble) just forget that big rock for now. That's too big to handle.

YOUNG Well it's inaccessible it's underneath the engine cover.

CAPCOM Okay fine.

YOUNG Do you want me --

END OF TAPE

YOUNG It's inaccessible. It's underneath the engine cover.

CAPCOM Okay, fine.

YOUNG You want me to crawl under the LM?

CAPCOM No, that's all right.

YOUNG Okay, but there's probably another nice rock. I'm sure there's another good rock around here. I've eying out my window and I wanted to get it anyway.

DUKE Hey, John?

YOUNG Yes Charlie.

DUKE I hate to tell you, but I need your camera for the -- here take mine with the black-and-white and let me have yours for the pan.

YOUNG Charlie.

DUKE I'm sorry.

YOUNG Pull out of sequence there.

DUKE Sure.

YOUNG Put it in.

DUKE Are you running them together so hard there that --

DUKE Let me --

YOUNG Okay, I got it.

DUKE You got it?

YOUNG Yeah.

DUKE Okay.

DUKE Okay. Happy birthday, it says. PGC, let's see 10 quad 3. Well, guess what? The girls -- wrong side. (garble).

YOUNG (garble).

DUKE Works better for me, Tony, if could skip out here rather than -- If you want some of this blackish rock, John, or a small one, it's baggable and there's a bunch right out it. It looks just like what I call that basalt. In fact, there's hundreds of them.

YOUNG Yea, they're from that little impact crater we just landed beyond. And I want to get this nice white one right here.

DUKE Okay, the old pan -- And that's 11, at 250. Okay. Exactly 60 feet to the left, Tony.

CAPCOM Okay.

DUKE The S-band. Boy, it sure looks different looking up-sun. And you can still see those radiations in Stone Mountain. In fact they're maybe a little bit more pronounced.

CAPCOM Okay. Do you feel like they're the same angle?

DUKE Yea, exactly the same angle. Down at the bottom, there aren't any. They start in one place, that is, and it's a little ridge. It's to the east of (garble) down at the base. The one that we call the base here. There's two

DUKE pretty predominant craters. Right there, there aren't any.

CAPCOM Okay, why don't we just drive out.

DUKE All over the mountain.

DUKE Okay, I don't think we're going that far east, but -

CAPCOM Okay, those extra feet -

DUKE Tony, what is the other peak.

CAPCOM Right, of the cosmic ray experiment, so if you'll go over to that side we would like a cross sun, at F11 250 at 15 feet.

DUKE Okay. across F11 250 at 15.

YOUNG Okay, Houston, I just picked up this rock. It's a white rock, very white rock, but it has a black glass layer on the back of it or what appears to be black glass. A thick black glass, and it's about a hand size specimen. I can't get into the bag, but I'll get it anyway. And it has a lot of SAP craters in it and some, lining the SAP craters there's some whitey substance.

CAPCOM Okay, John. Sounds good, and Charlie, we'd like a like an up-sun of that cosmic ray also. And the settings on that will be F5.6.

DUKE Okay, looking up-sun. Okay. Do you know that thing is not even looking at the sun, is that right. Is that what you want it to do.

CAPCOM That's right. We want it to look away from the sun.

DUKE Okay, that's what it is. I don't think you're going to see much in this picture, but I take it. It's a -- I guess it's just really going to show you how it's setting. Okay, now it's done.

CAPCOM Okay, good show.

CAPCOM And we'll have the UV after the first load-up.

DUKE What else?

CAPCOM That's it, Charlie.

DUKE (garble) enough spaghetti here.

YOUNG Charlie, don't get too close to that, and watch out for the battery cable.

DUKE I see that, it's just this Rover deploy cable I was in. Now, I'm okay.

DUKE Okay, we're ready for the load-up and I'll swap cameras with you.

DUKE Put yours on your seat, John.

YOUNG Where did those bags go, that you had?

DUKE I put them over here on my back -- there you go, Charlie.

DUKE Just leave it there.
 YOUNG Where?
 DUKE There.
 DUKE Okay, why don't you put those on my camera and I'll put these on yours?
 YOUNG Okay. I got two core tubes sitting up there too. Don't let me forget to get those.
 DUKE Where? Uon the bay?
 YOUNG Yeah, up on -- hand tool carrier --
 DUKE Do want them in this -- or do they go back in here?
 YOUNG What are we going with this SCD right here.
 DUKE That one goes under my -- that ones is going on my back. Is that the one I (garble) yesterday?
 YOUNG Okay, fine.
 DUKE And I'll get that. The other one -- You're going to be chop full of core tubes, today, Babe. I'll tell you. This is core tube taking day.
 DUKE And a super at the whatever. Okay, I'm ready for loadup, I guess.
 YOUNG Okay, hold still.
 DUKE Excuse me.
 YOUNG Okay, that's good. I think that's what I'm doing.
 DUKE Now on the old lunar surface.
 YOUNG We really kicked this stuff up, Tony around -- right around the lunar module where we walked -- where you don't have the footprints and the tracks, it's very smooth, very white albedo --
 YOUNG Charlie, could you bend over?
 DUKE Very white albedo of where we picked it up. It's about two shades grayer -- it's a darker -- albedo.
 DUKE And you know why I think that is, Tony? You look down-sun and it's not that way. You look upsun, and it is. I think it is the shadows that the sun cast on the particles that have ben disturbed. It causes it to give a darker albedo.
 CAPCOM Good observation.
 YOUNG Hey Charlie, that's --
 DUKE Okay, your turn.
 DUKE Man, you'll be able to carry this thing for the core tubes in it.
 YOUNG Guess what? Open it.
 DUKE I couldn't -- I did. I couldn't get it off a minute ago -- couldn't get it off a minute ago

YOUNG There we go. Just lay those things on
(garble).

YOUNG Isn't it easier on the moon to -- there's
a lot of trouble with the UV camera with the azimuth scale.
It's easier to pick the camera up and relevel it by putting
it into the dirt than it is to change the azimuth settings.
Every time you change an azimuth setting, you have to relevel
it.

CAPCOM I copy that.

DUKE Hold still, John, this thing is coming
off. Getting back to azimuth, setting seems to be getting
tighter and tighter. I don't understand that but it's you
know -- That's what it seems to be doing.

YOUNG (garble) Dadgum thing!

YOUNG If there was just a patch of velcro.
On these bags -- the one on your PLSS you wouldn't have
to worry with that strap.

END OF TAPE

YOUNG So you wouldn't have to worry with that strap. Okay, I'll give you the EMU status check while I stand here, it's 385, cooling, no flags and reading these 4 percent.

CAPCOM Okay, we copy.

DUKE Does that sound about right to you, Houston?

YOUNG Could I be that low this quick?

CAPCOM Over connect?

YOUNG I mean I'm reading about 80 percent.

DUKE So am I, John.

YOUNG Oh, okay.

DUKE Okay, my flags are clear, Houston, and I've got 80 - oh let's see - I got about 83 percent. And I'm in cooling, and pressure is at 385 and I'm very comfortable.

CAPCOM Okay, good show.

DUKE Happy day. Okay, LRD prep HDEC RCU bus C to RCU, pan, I got HEDC RCU to left seat.

CAPCOM And Charlie, verify (garble) on the (garble) and the DAK's running.

DUKE It's not running, but the Q mag is there. I'm -

CAPCOM Roger. We just wanted you to verify that the DAK was working.

DUKE Okay, just a minute. Yes, believe it or not.

CAPCOM Good show.

YOUNG Okay, going to reset the 4 UV again, one more time.

CAPCOM Okay, and your azimuth will be 276.

YOUNG Okay, 276

CAPCOM And the elevation 14.

YOUNG Okay, Houston, going to reset. It worked. This must be the volcanic gases cause it's looking right at Stone Mountain. Is that what you want?

CAPCOM I'll find out John, but 276 and 14 is target.

YOUNG Okay, fine. That's a vet and she's working. Duke - There's the big eye looking right at me. Boy, you can't get away with a thing around here.

CAPCOM You're darned right.

DUKE Okay, John, come in, I'm ready to go.

YOUNG How do you want - (garble) I did it now.

YOUNG Okay, we're going to mode switch to 1 on the RCU, Houston.

CAPCOM Okay.

YOUNG And the TV's going to TZW.

PAO Mode switch to 1 obviously refers to turning the TV off. The crew will now be getting aboard the lunar roving vehicle somewhat ahead of schedule - about 13 minutes earlier than the nominal flight plan and heading for Stone Mountain. The first stop up on the side of Stone Mountain at Station 4, that's about 4.2 kilometers, and it'll take them something on the order of 35 minutes to drive that distance. On route, they could also encounter a number of large blocks.

YOUNG I get system reset. And we'll climb in this beauty I hope. That's how you want to do that isn't it Tony.

CAPCOM Say again, John?

YOUNG Okay, you don't need front alinement or any of that stuff do you?

CAPCOM Yes we do, John. We need descent alinement and go to reset.

YOUNG Okay.

CAPCOM And John do you remember what the exact heading was where you were parked.

YOUNG We're parked there now. It was 358 or whatever it's reading on there.

CAPCOM Okay, fine.

YOUNG Don't you guys remember, I read it out to you?

CAPCOM Alright, you just read north.

YOUNG You want to start from here or do you want to turn - okay.

DUKE We've got to get headed west for a nav update, John.

YOUNG Okay, that's what we're going to do.

DUKE Still works.

CAPCOM Good show.

DUKE We're under way.

YOUNG Do you want a nav update from here now or don't you?

CAPCOM Yes, we do sir.

DUKE We've got to get it.

YOUNG Okay, wow horse.

CAPCOM And while you're there, we'll need a complete LRV readout.

DUKE (garble) Okay, Houston. It's reading 1 degree to the left, the sun is and we're heading of 268 bearing is 000 000 range 000 course and we are pitched 4 degrees down, and we rolled 1 degree right

YOUNG - cause Charlie's heavy, today.

DUKE You rat.

DUKE Boy, I didn't see that secondary from
out here on the ground, you can't see - the rocks are buried
from -

YOUNG Look at those rocks around there, Charlie.

DUKE I know it. There's your basalts and
things. They're probably glass covered, don't you think?

DUKE They are. I picked up one out there.
See where my foot -

CAPCOM Okay, I torqued to 264 and could we have
the rest of the numbers on the IRD.

YOUNG Okay, stand by.

YOUNG Okay, 264.

DUKE Okay, we got 114 and 114, make that
108 and 108 off scale low off scale low. On the amps volts
are 68 68 batteries are 82 and 60 - oh wait a minute, 80
and 95, motors off scale low.

YOUNG Hey, Houston. The RCU covers are supposed
to be 100 percent open at this point ain't they?

CAPCOM That's correct.

YOUNG I'd better get off and open that right.

Okay.

DUKE Want me to do it John?

YOUNG Yes, I guess you'd better Charlie, can't
seem to unfasten this radsal here.

DUKE I got it.

YOUNG I got it.

DUKE I got it already.

DUKE ~~Oh!~~

YOUNG Watch it Charlie. Don't hit any
antennas (garble)

END OF TAPE

DUKE Ah, here we go. Watch this. Oh, my pencil fell off, but that's okay.

YOUNG Suppose you need that pencil?

DUKE Yea. I can't even see the map, much less the pencil.

YOUNG Looks like you in pretty good shape.

DUKE We need a map holder like a windshield wipper. You can tie her up, I'm -

YOUNG Wait a minute.

DUKE Okay, hooked. Let's go.

YOUNG Okay.

DUKE Okay, DAP's coming on. Mark.

YOUNG Okay, give me the first heading again, Charlie.

DUKE 164.

DUKE Okay, Houston. We under way.

CAPCOM Okay, good show. And even with all that extra there, you only leaving 2 minutes late. Outstanding.

YOUNG You're kidding. We must have forgotten something, Charlie. That's all I got to say.

DUKE No everythings running. Okay, Tony. As we cross out to the west here, or south. we see alot of these black rocks with the white phynocrist.

YOUNG All we see is big white rocks with black phynocrist. How about that, Houston? Black glass I mean, excuse me.

DUKE Okay, we've got a great view of all the way into Stone We're right upon a ridge here, Tony. We're at 10° bearing 1.1 range. There's a 3 meter, 1 meter boulder to the right that's very angular. It's just as we've already discribed. The black with the whiteish inclusion. We can see all the way to the base of Stone Mountain and Survey Ridge. There's some secondaries around. The terrain is covered with about 3 per cent of the surface with cobbles up to 15 centimeters, a couple of inderrated little secondaries.

CAPCOM And Charlie, verify the DAP is on.

DUKE They are a meter or so - Yea, I called back on.

CAPCOM Okay.

YOUNG Uh oh, Charlie.

DUKE I feel it running.

CAPCOM Good show.

DUKE Okay, now Tony. We're going down a, an incline down slope at 356 at .3, that is about, would you say about a 5° slope, John. And the boulder population and the cobble population has picked up over here to about 10 percent, I'd say.

CAPCOM Okay, there were those mounds maps over at (garble) can you see those

DUKE I think we're just now coming up on -

DUKE The mounds mapped where?

CAPCOM In the area of Fannin crater, that will be to you left at about, oh, it would be about 10 o'clock now.

DUKE No, it's over Fannin crater's over a ridge. I think we're coming by WC, is what we're really coming by. I'll try 1 o'clock, make it 3 o'clock now, 350 at .3.

CAPCOM Okay.

YOUNG I think your right, Charlie.

DUKE Okay, the largest blocks we see are a meter. The regolith seems to be loosely compacted. Much like the regolith over at the, which is characteristics of all of the (garble) here. Most of the rocks are angular to subrounded.

CAPCOM Okay. Do you feel your pulling that rake.

DUKE Still in this Ray.

YOUNG Just covered with blocks and holes, Houston.

CAPCOM Okay, we copy.

DUKE Lots of , lots of secondaries, Tony.

YOUNG Charlie, what are we shooting for.

DUKE Well, we're suppose to be 17 - let's see.

CAPCOM Okay, the heading on the (garble) is 162.

YOUNG (garble)

DUKE 1.3. Okay, we've got .6 now. When we get there we should be 353 at 1.3. We're traveling a little bit east. I think if you, man, you look like you're haeded just about for our spot. See Survey Ridge down there.

YOUNG Yea.

DUKE Hey, this is a great place to keep this map. Right, wedge it in that camera. Ya Hoo, man, that was a great big skid. We're doing 10 clicks, Tony.

CAPCOM Outstanding.

DUKE Still down about a 2°, 2 to 3 degree slope. Oh Barnie's really driving this beauty.

CAPCOM Do you have an AMPS at max D.

DUKE D. I'm sitting in it, and I can't tell you I'm setting in volts right now.

CAPCOM Okay, fine.

DUKE Tony, an observation here, the dust covered rocks, are mostly rounded. The angular rocks seem to be free of dust.

YOUNG And there sure are alot of rocks here.

DUKE Still as we discribe cobble, cobble size is still the same. Maybe 10 percent of the surface now. Tony, we're starting out with, we forgot to say it, but we're starting out with the correct magazines, as per check list.

CAPCOM Okay, good show.

DUKE Lot easier driving down here, isn't it, John. Not any real big craters. Lot of subdud -

YOUNG It's not any easier, it's just that you can see what your doing.

DUKE Yea.

YOUNG But it doesn't seem to be as rough as I thought.

DUKE Okay, we're at 348 at .8 now, Tony. Still underrated secondaries.

CAPCOM Okay, you should be about halfway to Survey.

DUKE Okay, yea. We see Survey right up there. That was properly mapped. Most of the secondaries are the craters here, Tony, are in the meter size. Some of the larger ones may be 5 meters. Okay, it's getting alot rougher now. Alot more (garble) at 346 at .9. Slowing down to about 6 clicks.

YOUNG Go.

DUKE That's going to be a steep slope up there, John.

YOUNG I believe it is, Charlie.

DUKE Up Stone.

DUKE Okay, we're looking for 35 - about, about 1.3 clicks we should be on Survey, at around 35 or so. Looks like that's Survey dead ahead, to me.

YOUNG Looks like to me.

DUKE Tony, it's apparently - this ray is pretty extensive. We haven't got out of this cobble field yet, and we're now 1.0 at 348, and the percentages are just exactly the same. The characteristics of the regolith are identical, and it still appears loosely compacted. Almost like a, a freshly plowed field that's been rained on.

CAPCOM Okay, we understand that.

DUKE Right now, we're in an area, at 1.1 at 345, 346, with 4 blocks that are a meter, to a meter and a half size, make that 6 blocks now, and we're in a - off to our right, there's a slight depression that's maybe 20 meters below us, that extends over to a ridge that blocks out Stubby. And we're coming up to the biggest rock now we've passed on a traverses, click, got a picture of it. And it's got, it looks like a breccia also Tony. It was rounded.

YOUNG Now shoot, man.

DUKE Golly. Covered me with dust on that one.

YOUNG Sorry Charlie.

DUKE That's okay. That looks like a pretty good pass off at about 2 o'clock, 1 o'clock, John.

YOUNG Yea.

END OF TAPE

DUKE That looks like a pretty good pad off about
2 o'clock, 1 o'clock, John.

YOUNG Yeah.

DUKE Okay, now the percentage of cobbles is
picking up, Tony, at 1.2 at 344 and we're about maybe now 20 percent
of the surface is covered with cobbles up to 15 - make it
30 centimeters, with the largest velocity in the meter size.
Looks like these larger ones are caused by - there's some
craters here 5 meters or so that appear to me to be a series
of secondaries right in this area.

CAPCOM Okay, we copy that; You may bear back to the
right about 10 degrees.

DUKE GARBLE.

DUKE I think that's a good plan.

DUKE Okay, we'll do that. You can still see the
rim of north - South Ray, spectacularly white - it just stands
out above the surrounding terrain in auto magnitude.

YOUNG Hey why don't you head down Survey ridge
where I think we are right now, Charlie.

DUKE Okay, we should be 1, okay, come down
Survey at about 227.4.

YOUNG Yeah, this is Survey.

YOUNG Top of the Survey, Tony has got a lot of
secondaries. 30 percent of the surface with cobble, predominantly
in the 10 centimeter range, but some greater than that up to
50 centimeters.

CAPCOM Okay, take plenty of Hasselblad pictures
there. GARBLE.

DUKE I'm taking this off as fast as my finger
will pull the trigger.

CAPCOM Good show.

YOUNG Uh oh, watch it Charlie.

DUKE I got it. Okay. Okay, I'd say now 70 per-
cent in this area, 70 percent is covered, 347 and 1.5.

CAPCOM Okay, 1.5 that's where we mapped you on top
of GARBLE.

DUKE Tony if we'd have gone - okay, if we'd have
gone to 353 on Survey originally, we'd have been down in a big
depression.

YOUNG I'm still pretty depressed at this point.

DUKE Oh, me too. John, this is really a ray it
just goes right in the top ray, boy you just can't believe
a block, Houston. The block population on survey - what is
it 50 percent, oh, I would say - estimating 60 to 70. And you
can track it right in, up across, over the ridge it blocks
out Wreck, and Stubby into South Ray. We're going down slope
now off of Survey, still heading about east.

YOUNG We've got to get out of these, Charlie.
DUKE No, I think -- yeah, the rover is hacking
it with no sweat over these little ones.
YOUNG GARBLE.
YOUNG Getting the rest of the day in unreel.
YOUNG GARBLE.
DUKE Yeah, I think you can hook a right here a
little bit John. Looks pretty good. There's really a lot of
craters here Tony at 1.6 it's 348. The top of Survey is just
pockmarked. They are pretty subdued though. We can drive
through up to 3 meter ones with no problem. You can still
make it 6 GARBLE, John. The characteristics in the rocks,
Tony, are the same as around the lunar module.
CAPCOM Okay. If you get a chance to look at the
southeast bed of Turtle why don't you see if you see any beds
in there.
DUKE That's one of the white ones -
DUKE Ton, not a chance.
CAPCOM Okay.
DUKE It's pretty well rounded Tony and it just --
the only predominant feature here is this ray pattern with
all the secondaries.
CAPCOM Okay.
YOUNG Best set of rocks you ever saw, I'll tell
you that.
DUKE Bet it'll be no trouble sampling the South
Ray, it's station 8, it looks like that this ray goes right
across it.
CAPCOM Very good.
DUKE And we're 1.7 and 352 and sort of back down
in almost, we dropped maybe 20 meters, just passing a secondary
that's 10 meters across.
CAPCOM Okay, you should see Merriam over to your
right.
DUKE Merriam would be down over the ridge.
CAPCOM Okay.
YOUNG Man there's a great split boulder right there.
YOUNG It was a GARBLE split there, Tony.
DUKE Very undulating terrain, hummocky, the
GARBLE, hummocks are - oh are -
YOUNG What's your GARBLE down here now, Charlie.
DUKE Okay, we've still got to go 3, this is the
one it's GARBLE from here up over is -
CAPCOM 168.
DUKE 57 for four tenths. We should be 005 at
1 - 005 at 1.6 to cross then we turn south again. We're at 1.8
but that's because we're a little -
DUKE I think we could go straight for them John.
There Cinco is right up there on the hill.

CAPCOM All right, we think you could just about head south now.

YOUNG I think we should go straight forward I want to get out of this ray.

DUKE Okay, we are. We're going 180.

DUKE This is terrible, this ray, isn't it?

YOUNG Yep, that's why I want to get out of it.

DUKE Yeah. Okay, we must be coming to the edge of it and my estimate of cobbles is back down to about 20 percent now. We have secondaries within secondaries, predominant crater size is still meter or so. Only a very few of the secondaries are indurated, coming up on one now at 20 and 355.

YOUNG Boy, isn't it something, this is really something.

DUKE You're still going 8 clicks through John, we're right on. Okay, Tony apparently we're still on Survey. It's a wide ridge. It's furrowed, parallel to the long axis. Now there's a big crater off to the right, JOHN, and here is 5 right up here, about 12:30. Are the Cincos right south of Crown through, it's the one to the right where we want to go. See that big crater up there below Crown.

YOUNG Yeah.

DUKE Okay, now you're headed right for it. And Cincos are right to the right of that.

YOUNG Apparently.

DUKE I think that big one is probably Cinco E.

CAPCOM From where you are Cinco should be right behind you John.

DUKE It is Tony, right now. We got it spotted.

CAPCOM Okay.

DUKE Got a little crater on the inner plank. Okay, join 10 planks and it's still in the cratered, saturated downflow from Survey Ridge at 354 at 2.2. Block population is still the same. Looks like we don't get out of the ray really until we hit and start climbing upslope at station 6. Houston, the best idea I can give you of what this looks like, is it looks like about half-way up to that crater that we went to out at the Nevada test site. Man, I tell you, I've never seen so many blocks in my life.

CAPCOM Okay, sounds like that was a good exercise then.

END OF TAPE

DUKE Good exercise in driving.
YOUNG Oh, that was a baddy.
DUKE That hit on the floor board, that's okay.

DUKE I'm even getting dust on my helmet. Boy, this is neat, really neat. Okay, now between us and the survey, Tony, we really drop off again down to the base of stone. We're going down a 4 or 5 degree slope that's still, apparently ejecta - South Ray ejecta. We're down to perhaps 10 percent now in block frequency, the character of the regolith is still the same, loosely consolidated with a raindrop pattern. It probably looks that way because of the sun. I'm convinced of that. The rocks are mostly grayish with white glass in them.

CAPCOM Okay, what's the bearing and range for that - getting off the context.

DUKE Okay, we'll give it to you. We're right now at 354 and 2.5. We're still in a blocked field. It'll be about another 2 glicks before we're out of it.

CAPCOM Okay.

DUKE Okay, I just don't think you can identify these things as contacts per se.

CAPCOM No, we understand.

DUKE They just fade out and then they go away. Okay.

CAPCOM Okay, you're about 2 or 300 meters from the contact as it's mapped with the Descartes or the feathering out there. We'd like you to keep an eye out for any changes in regolith.

DUKE Okay, you got it, Babe, and I think that's a pretty good guess at least that's where the slope of stones start. That Stone Mountain looked like it was right on top of us. And we've come 2.6 kilometers and it still looks just as far away.

YOUNG It's really something.

DUKE Okay, Tony, characteristics are still the same, it's up on survey 10 percent, cobbles about the same size, maybe a smattering more of the larger ones 50 centimeters and up. Some of the rocks seem in good shape and are hardly fractured, others appear to be badly fractured, but still homogeneous.

CAPCOM From your description, it sounds like we won't have any trouble finding split boulders at 8.

DUKE I don't know, I don't see any, but one split boulder so far, not that I've been looking, but I would if there were some. Hey, that was super. That wheel just left the ground.

YOUNG (garble)

DUKE I love it, this is great. 8 clicks, Tony. We got up to 12 there once. We're at 355 and 2.8 still have Crown and Seko E in sight.

CAPCOM Sounds like you're really making money there.

DUKE And we got to go

DUKE over another depression, down through another depression before we hit the upslope. That's about 100 meters in front of us. Boy, it's a spectacular view looking out to the west, Tony. In fact, it looks like a whole mountain itself to the west. I think - and that poop about being able to see the LM all the way on traverse 2, I think was going to be bum dope. We've come down some big swales.

CAPCOM Okay.

YOUNG They call them swales in your part of the world, Charlie. They call them mountains in mine.

DUKE Okay, in my 9 o'clock position out about a kilometer, and we're at 355 and 3.0 is a tremendous boulder that must be so far away, but it's very predominate on the skyline. It must be 5 meters or so.

DUKE I can't give you any new words, Tony. The regolith is still the same. We're still in a block field. we're just about to start upslope - have we been climbing John? Look at that pitch meter.

YOUNG Maybe, we have been climbing. I doubt it.

DUKE (garble)

CAPCOM Okay, Charlie. We'd like that dak on 12 frames per second.

DUKE Okay, 12 frames a second coming up. You got it.

CAPCOM Okay.

DUKE Okay, you're looking right at Sinko and Tony, we've really been climbing - it doesn't feel like we're climbing, but we've been climbing for quite awhile here. I just looked at the pitch meter and it was pegged out a minute ago.

CAPCOM Wow.

DUKE We're climbing up about a 10 degree slope now.

CAPCOM Okay.

DUKE And let's see 6 was at 000 -

YOUNG Charlie, what should we be heading for.

DUKE Those craters up there.

YOUNG Oh, don't tell me that, where?

DUKE Okay, see that one that's sort of a funny shape looks like it's got a breach in the southeast side at 12 o'clock, that's it.

YOUNG The one at 12 o'clock, huh?

DUKE Yes.

YOUNG Okay.

DUKE Well, Houston. Now that we're getting up to Stone Mountain, my assessment is that it's not any worse then what we've been driving down. I think this is one of our benches here, John.

YOUNG Think it is, huh?
DUKE Yes, we're at 33 and 5 should be at 33
and - okay Tony, we're on a flat area now at 355 and 3.3
and I think it apparently is a bench. We're passing station
5 - a little to the east.
CAPCOM Okay, glad you can recognize it there.
That's great.
DUKE And it's - I tell you, it's just as
blocky here, the block population is up again to about
40 to 50 percent.
CAPCOM Okay, you might look for a fresh crater
that would punch through that ray material in the Descartes
for our station 5 when you come back.
DUKE Okay, most of the craters here are -
YOUNG There's another split one, but it - There
goes South Ray, Charlie.
DUKE That's beautiful, just spectacular. I
can't believe it. And there's Baby Ray, John.
YOUNG Yes?
DUKE Yes, and you can see it. And it's got
black sides to it. Okay, here's a crater, Tony. Remind
us at 354 at 3.4, it's about 15 meters across and about 5
meters deep and I'll bet you it points through.
YOUNG Oh, man this -
CAPCOM Okay, we'll keep that in mind.
DUKE And that should be a good enough -
that should be a good station 5.
CAPCOM Okay.
DUKE Say, we are really going up a hill, I'll
tell you.
CAPCOM How about the traction, are you slipping
at all?
YOUNG (garble)
DUKE Okay, see, there seems to be over here
by this oblong one - which I think is Cinco E, John. We
go up a steep slope and then it seems to level out right
up on top. Okay.
YOUNG Yes.
YOUNG Look at that bench and Crown.
DUKE I know it.
DUKE No, we can't see Crown now.
YOUNG What is that thing with a V in it?
DUKE That's Cinco E
YOUNG The one with the V in it?
DUKE Yes.
YOUNG Let's go sample that.
DUKE Okay, that's what I was thinking. See
it seems to be at the steep slope going up to it, but it
looks like a bench or little ridge on top. Okay, we're at
354 and 3.6, and you ought to see that Baby Ray, Tony.

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DUKE It's got a real good rays around and
it's got lots of blocks around it that are hard to estimate
in size, and we're going up a steep steep slope, John.

YOUNG I'll tell you.

CAPCOM We believe you Charlie.

YOUNG We're on the mountain.

DUKE And it's got black streaks -

END OF TAPE

YOUNG Here on (garble).
DUKE And it's got blank streaks coming out of it. Okay, our amp's are now up to 60 -- wait a minute that's volts.
YOUNG Here, Charlie.
DUKE This is going to be spectacular! I can see (garble) and (garble) and orange juice. Golly. There's a little bit shown up there a little bit, John.
YOUNG Okay, we're getting up a bench right now.
DUKE And, boy, this is going to be such a spectacular view, I can't believe it. Okay, we're at cinco Tony. We feel at 3.7 at 355.
YOUNG See it anywhere, Charlie?
DUKE What? Cinco -- yeah, this is it. Here's one, there's one and the big one is just to the left over there with the V in it.
CAPCOM Charlie, you probably are at one of the lower cinco's not D or E. You should have something like 4.0.
DUKE Okay. We'll go on up.
YOUNG Boy, a little easier driving uphill than down.
CAPCOM And you're well ahead on the time line. You've been making good time.
DUKE Tony, I can see into --
YOUNG Charlie, let's up through this big blocking crater. Man, that's really good.
DUKE Where's that?
YOUNG Right up there.
DUKE That's crown.
YOUNG You don't want to go up there?
DUKE Yeah, that's fine with me.
DUKE Look's like a pretty steep slope.
YOUNG No, it's not.
YOUNG It might be.
DUKE I don't think I'm going to be able to see Stubby from --
YOUNG Can you see it from here?
DUKE Yeah, I can see it now. Boy, it's a bad place to stop here.
PAO Crown crater is about 60 feet above the plan's stopping point.
DUKE Pretty good right roll, Tony. About 5 to 10 degrees right roll and climbing up a steep slope.
DUKE And John, here's a great ditch right up here. It might be a crater. Just right in front of us about 20 meters. Why don't we stop there?
YOUNG Right up there, you mean.

DUKE I'm talking about right -- just really right here. See this big block at about 1 o'clock at 12:30?

YOUNG Right here?

DUKE Yeah, right here.

CAPCOM And, okay, we concur with whatever blocky crater you want to stop at up there.

DUKE Okay, go ahead, go ahead.

YOUNG Okay, its on a flat bench too?

DUKE Yeah.

CAPCOM And go ahead and mark for NAV update down sun, if you can find a leveled place.

DUKE Okay, super. And Tony, I think we're up at just about the Crown crater.

CAPCOM Okay. The main thing is to make sure that we have a crater that's big enough to punch us through any ray material from south ray.

DUKE This one does. Don't worry, this is a 10 meter crater that's got blocks on the inside of it that are partially covered with fillage material.

CAPCOM Okay.

DUKE And that's at 354 at 4.0.

DUKE Okay, John. How about looking left -- this is going to be pretty good. Now I think we're going to be surprised -- look at those blocks, John!

CAPCOM We think you're at one of the sharps Cincos.

DUKE I do too. Hey, can we get up there closer to get enough -- right in that block, John. The one -- before the wall?

YOUNG That slope?

DUKE Seems to be a flat place about right up here. Yeah.

YOUNG This almost flat?

DUKE Well, according to the pitch meter, it's not, It's pegged out.

CAPCOM Hey, fellows, Ken was just flying over and he saw a flash on the side of the Descartes and he probably got a glint off you.

DUKE Yeah. That's us, men of miracles. We're dusty.

YOUNG I'm going up here and set in a crater so it doesn't go anywhere.

DUKE This looks pretty good. I don't think it's going to go downslope.

DUKE Tony, you can't believe us -- be looking back to the east. We see ravines -- We see the rim of the North Ray that's got some really good blocks on it. Look at this slope. Look at what we've been coming up. Man. And -- but

DUKE we cannot see into North Ray. It's above acquisition. But we can see the whole lunar module! Look at that, John. Okay, 270 on the headings.

YOUNG Okay, Charlie, I want to go back down there and park in that flat -- in that crater right there.

DUKE Okay.

YOUNG Want to stay in?

DUKE Yeah, okay. Looks like to me, from my side, if you just turn a real sharp left, you'd have it, but that's fine where it is.

YOUNG It's not flat, Charlie, it's pointing to downhill.

DUKE On sideways it wouldn't be.

YOUNG Huh?

DUKE Sideways. We got to park 270.

DUKE But that would be fine. Why don't you go down there, John. You probably would --

DUKE Look at that big rock.

DUKE Declared it.

DUKE Which one are you going to park in?

YOUNG Right down there where that block is.

DUKE The right?

YOUNG Yeah.

DUKE Okay.

DUKE That's a good overturnable one right there, John. Hey, we can roll that thing downhill.

DUKE Look at that beauty climb over 1 meter block. Okay, Just about got it. Just about -- great, great, super! Okay, we're parked, Tony, at heading 270, 354, 5.2, 4.1, 100, 100, 70, 6868, 85, 100, off-scale about 200, 200 and 200, 200, and I'll give you the readings.

YOUNG Okay, Houston, we're in real bad shape because our vehicle attitude indicator enroll -- that's why you thought it was so pitched. The thing is broken, Charlie.

DUKE It is. Yeah.

YOUNG It's broken. See, it split off up there, but as soon as we get the TV, anybody, would be able to tell where we're at.

CAPCOM Okay. On the SSD, can you estimate a roll well enough for an update?

YOUNG I think we're rolled about 4 degrees left, and we're pitched down about 5 or 6.

CAPCOM Okay. And get that D.

DUKE Okay, sunshadow, it's 9 degrees left.

YOUNG Left.

CAPCOM Okay, we copy 9 degrees, and Charlie, you want to check the DAC?

DUKE Okay, checking it off. Standby.
YOUNG Charlie, whatever you do, don't hit that
brake.
DUKE Okay.
DUKE Darn, it's pretty level it seems like
right here.
YOUNG Now, that's what I hope.
DUKE DAC's off, Tony.
CAPCOM Okay, Charlie, and can we have your frame
count?
DUKE Okay, the mags empty on the DAC.
Up frame count is 82.
CAPCOM Okay, we copy. Sounds good.
DUKE Okay, got the display? Is Ken coming
around to get the 500?
DUKE Tony, I -- you just can't believe this --
there's a ray -- this view. You can see the lunar module,
you can see North Ray, with boulders on the southwest side
and where station 12 is, there's one huge boulder that's
going to be just great. It looks like we can get up there
and there's a great ray pattern going up the side of Smokey
Mountain from North -- the North Ray.
CAPCOM Sounds fantastic at 500 millimeter so
do a job for it.
DUKE Boy, I hope so. I can see super into --
YOUNG Charlie, quit pushing this thing around

END OF TAPE

YOUNG Charlie, quit pushing this thing around.

PAO This is Apollo Control. It sounds as if the crew is getting ready to set up the HIGH GAIN antenna, give us a bit of television.

DUKE Could you turn on the HIGH GAIN. I can't reach it.

PAO And we would also like to mention, at this time, that a decision has been reach, not to attempt to repair the heat flow experiment which was damaged on the first EVA. I repeat that we have decided not to attempt to repair the heat flow experiment. The crew will be spending about 1 hour at this location. They should be somewhere in the vicinity of 750 feet above the landing site on the side of Stone Mountain.

DUKE John (garble) and the pitch scale is falling off, but the needle is in the center.

YOUNG (garble) about the (garble) gravity radiance looking at the LCRU up there is about 3° pitch down, 4° pitch down.

CAPCOM Okay, we copy that.

DUKE Oh, wait a second, do you want me to get the (garble).

YOUNG Yeah.

CAPCOM And while you're playing around the LRV there, how about the hold band switched to AMP.

DUKE Okay, I did that. We saw that they were low.

CAPCOM Okay, fine.

YOUNG (garble)

DUKE Stand by.

YOUNG Okay, we want to point it at it, Charlie. It will be hard to do this way. (garble) we can go in at the front here, Charlie.

DUKE Ah ha, there's that beauty.

CAPCOM Hey, we've got a picture.

DUKE Hey, Tony. That thing's piece - okay, that things a piece of cake for alining at 270.

CAPCOM Okay, that's good news.

DUKE Okay, starting with the 500. I'm going to intermediate. I mean head position on the cooling. I'm going to intermediate, I mean head position on the cooler.

YOUNG Hey, it does.

DUKE Tony, you can see the rays of South Ray come out across the landscape, albedo-wise, and it's really predominant -- they cross right across, go right up Survey, and it's definitely ray pattern that we were crossing. Okay, 500 of Stubby, 15 and that's not worth 15 pictures, Tony.

CAPCOM And John, before you start sampling there, could you give us a general impression of the rock types.

YOUNG Man, it looks like to me just rock solid. We're standing there and it's about the same type of rocks. As you can see, they're angular. Let me go over there and look at this big one.

YOUNG I think their (garble). They are very, they have a very sharp appearance. There's a boulder we can turn over Charlie.

DUKE That's what I was saying.

YOUNG It's a big one. Right behind us. The trouble is I don't want to push it into the rover.

DUKE Okay, Tony. I'm taking some 500 of South Ray. I can see into the rim on the inner wall on the south side, and the characteristics of the thing, it's got block streaks and white streaks coming out of the wall right over the rim, which says to me, there's two types of rocks down there.

YOUNG That's right, Charlie. That's what it says. And that's why the dark, your dark streaks show up on your photographs. It's not, it's not that that thing wasn't throwing out blocks in every which direction. That dark streak right down through the middle of your photograph, it probably, it looks as dark as in the area, and it's probably dark material from South Ray.

DUKE The - Tony, Stubby is a very subdued old crater. It's not worth 15 pictures really. It's not much to it.

CAPCOM Okay, copy that.

DUKE (garble) not at all. I see some secondaries in the inner flank.

YOUNG It doesn't look much different than the subdued craters that we just came across.

DUKE I've just got to get a picture with the 500 on the old ORION setting out there. It's spectacular. Okay, I'm going to take a couple of North Ray, Tony. Most of these rocks have a whitish cast to them, Houston, but - Okay, Tony. I'm up to frame count 90 on the magazine Lema.

CAPCOM Okay.

DUKE Whow! What a place. What a view. Isn't is John.

YOUNG Absolutely unreal.

DUKE We really come up, Tony. It's just spectacular. My gosh, I have never seen, all I can say is, spectacular, and I know ya'll are sick of that word but, my vocabulary is so limited.

CAPCOM We're darn near speechless down here.

DUKE Okay, (garble) description is -

DUKE Can you guys see how really spectacular the view is?

CAPCOM We sure can.

DUKE Hey, where is the big eye. There it comes.

CAPCOM We're looking at you.

DUKE Look up slope, Tony. Okay, look on upslope and you see all this rock field that we're in here. Okay, anyway I put the rake, the rake's coming up next, John.

YOUNG Okay. I was just going to get this one sample.

DUKE Okay, go ahead. Then we need a pan. That is after penetrations and then I've got to get the, guess what's coming up. I almost picked this thing off the ground. That thing doesn't look like it's too stable.

YOUNG What's that.

DUKE That wheel's off the ground. The rover. The right rear wheel is off the ground. I think we need to dust the TV lens. It's pretty dusty.

CAPCOM Yea, Charlie. If you get a chance, we would like it dusted.

DUKE I can get the lens brush.

DUKE Yea, it looks really dusty, Tony. Just a minute.

CAPCOM Okay, these blocks we see lying around the surface, are most of them South Ray.

YOUNG No.

DUKE Boy, I'll tell you, Tony. Up these, I just came up about a 20° slope and it is really loosely compacted here. Stand by. I'm going to swing the big eye around. I can't dust unless I do that.

YOUNG Okay, Houston. I've got a hard rock. I think it's glass coated, but it's so dust covered I can't tell, and it's going in bag 394.

CAPCOM Okay, 394.

DUKE The block population here is - okay. Your all dusted -

CAPCOM Thank you much, Charlie.

DUKE Houston.

DUKE The block population here in the immediate area is 60 to 70 percent, with the biggest one being right in our little crater. It's a meter or so. They're all very angular and - but the prime size, the majority of them are less than, oh, less than 30 centimeters or so. There is a good proportion 50 -

YOUNG Let me put this in your bag, Charlie.

DUKE Okay, coming around. Got to get the rake. Most of them are dust covered, Tony. Well, not most of them, in fact, most of them are not dust covered. The ones that I'm just kicking, the ones around I just kicked up.

YOUNG Got the rake?

DUKE Yea, I've got it.

YOUNG Shovel.

DUKE Okay.

YOUNG We don't need the shovel. You want to use that thing or do you want me to use the rake.

DUKE Let me rake this time and then I'll get on with the teletrometer.

YOUNG Okay, fine.

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DUKE Okay, where do you want to go? There's a
place right up here, John that looks like a good -

YOUNG Okay, let's not go to far.

DUKE I'm not. It's pretty steep. If you jackrabbit
up it, it's pretty easy to do. There's a place right here.

END OF TAPE

DUKE You can jack rabbit up here. It's pretty easy to do. There's a place right here that's got a lot of good ones.

YOUNG You look great, babe. Let me get up front. ll footer. Okay, got it. And let me get a locator full up your two.

DUKE That's going to be in focus now.

YOUNG Get in and we'll change this distance.

DUKE Okay, Tony, underneath this regolith up here we've still got the same deal - top centimeter show is

YOUNG The rake (garble)

DUKE I'm sorry. Okay, and most of the rocks are white clast.

YOUNG Glass coated too, a little glass coating on some of them.

DUKE There's a draw over 13 in that first scoop and there's - they're mostly white clast rocks. Here comes one that has a lot of glass on it. That ought to be enough.

CAPCOM Okay, we copy that. You think you're getting breccias there, then.

DUKE Okay.

YOUNG Well, we're not sure because they are dust-coated too and there is glass on them - they could be just chopped rock.

CAPCOM Okay.

YOUNG Okay that's going into bag 95.

DUKE I don't get GARBLE

YOUNG GARBLE breccia.

DUKE my self.

YOUNG I don't either. But it is an impression.

DUKE Yeah, boy oh boy I can't believe this. Okay, you want to get an after that John. I'll get a shovel for you. Okay.

CAPCOM And John we'd like to consider you are going to intermediate cooling?

YOUNG Okay, we'll do it. They don't need intermediate. You need - at least I - I'm comfortable just out of MIN. Let's see we need some more of that don't we. I don't want to get KELO. Okay. I saw that white stuff in the bottom. What I was going to say, Tony, underneath this top gray layer it is white again up here. Just like on the Kili.

CAPCOM Okay.

DUKE That is - that's the kilo isn't it.

YOUNG Yeah.

DUKE Okay, the rake. Getting - rake is finished. Golly.

YOUNG And it's in bag 396.

CAPCOM Okay, 396.

DUKE Oh, I'm sorry John I ran off and left you.
YOUNG You want me - throw it in my bag. Okay
that was supposed to be -
DUKE No, you've got core tube - let me carry the
rock. I'll have an easier time getting the core tubes out if
your bag is empty.
YOUNG Look at that view over there. Look at that
YOUNG You've got two core tubes too Charlie, you
mean to have two of them?
YOUNG Hey, Charlie we are having a hard time getting
a perspective that crater, could you give us dimensions, please?
DUKE Where we are standing?
CAPCOM Right.
DUKE What do you say, 10 meters, John.
YOUNG Yeah.
DUKE It's an old 10 meter crater, it's really an
old one. These other rocks around here might have been caused
by this - as matter of fact this might of - no I don't think
so - I think these rocks were laid in here when South Ray
came in.
DUKE Okay, Tony, on the penetrometer it's bided,
we'll call this crater the bidge if you want to and I'll get
one uphill, one downhill and two in the bottom of the crater,
how does that sound?
CAPCOM Okay, that sounds good to us.
DUKE Okay, and I'll start with a point 5.
CAPCOM Okay.
DUKE John, I'm glad we got those contortions,
I think the other two fell off back at the LM.
YOUNG Okay.
DUKE I don't think I ever put those back in your
bag, did I? Well - let's see, we've got plenty.
YOUNG I'm looking at a rock here, Houston, that
is a very angular rock and it has white clast with a breccia -
it has a breccia appearance. I'll take a picture of it and
sample it for you.
DUKE Okay, I'm going to take my camera off to do
this. Boy, this is so neat. Man am I having a good time.
CAPCOM Charlie we are too. And while you are
bouncing around there you might keep an eye out for a nearby
crater that looks like it may have pulled up some local material.
DUKE Now, we can't walk very far Tony.
CAPCOM Understand.
DUKE Oh, rat.
YOUNG What's the matter, Charlie?
DUKE I had the 5/10th cone in here and when I pulled
it out it came out like it was supposed to and I started moving
the thing down and it fell off. What do you do about that?

DUKE John, don't - don't walk right over here that cone is over there and I want to get it out.

YOUNG Hand me a set of tongs too, will you?

DUKE Okay, here you go.

YOUNG Okay, once you get it out can you put it back on?

DUKE I'll bring it over to you and if you'll hold it for me I think I can. How about whacking it on here and see if you can get some of the dirt out of the bottom of it. This dumb thing is not supposed to come out of there without being locked. My penetrometer is around here, wait a minute. Okay. Okay.

YOUNG Don't step right here Charlie, here's a splatter, glass splatter.

DUKE GARBLE. Oh yeah, I see it.

YOUNG A whole big bubble of it, isn't it.

DUKE Yeah.

YOUNG Now.

DUKE Yeah, that got it. Thank you. Beautiful.

YOUNG Okay. I'm going to grand sample this glass splatter behind the rover, Houston.

DUKE Good, hey Tony, Johnny see if there is one under that rock, is that the one you're talking about.

YOUNG Yeah.

DUKE Okay, Tony, can I start on number 5 on the penetrometer.

CAPCOM Okay, that's fine.

DUKE Okay, I'm going up out of this crater on the top part of it.

YOUNG And that's going into bag 397 Houston.

CAPCOM Okay, 397.

DUKE Tony, you just can't believe that South Ray crater, it is just - it is perfectly cylindrical - circular and it's amazing it is just really apparent that we got two types of rocks there.

END OF TAPE

DUKE It's really apparent that we've got two types of rock there. Okay I'm about up on the - up on the side now starting with 5 and we're pushing it in. Hey that's as far as it's going to go, Tony, and it went to half -- about 3/4 of the way up to the red mark.

CAPCOM Okay.

CAPCOM Okay we'd like you to change to 2 tenths.

DUKE (garble) going back down into the flat part. Okay. And, Tony, when you push on that thing you can't push with a very smooth force and it's going to -- you're going to see some spikes on our recording I'm sure.

CAPCOM Okay we understand that. That's fine, Charlie.

DUKE If you want my opinion on the thing I don't think we're hitting hard ground. I think what I did was probably hit a rock and I should probably move this thing over a little bit.

CAPCOM Okay we'll just go with the 2 tenths and see how that does.

DUKE Okay.

YOUNG Okay Houston. I'm sampling independently and I got 4 samples in mag 398. They're so dust covered that I can't tell anything about them.

CAPCOM Okay I understand.

YOUNG But I suspect they're alined by this big rock and they may be the same kind of -- the same kind of rock. Charlie, I'm going to get that bag from underneath your seat and put the samples into it.

DUKE Okay. Ya know John with all these rocks here -- I'm not sure we're getting Descartes.

YOUNG That's right I'm not either. We ought to go down into a crater without any rocks.

CAPCOM And Charlie you're on the big eye. We're watching.

DUKE Okay the 2 tenths -- the 2 tenths -- You see that and the 2 tenths went all the way in.

CAPCOM We understand. Can you tell how far it scoped up on the pressure? Do you think it reached the hilt.

DUKE No it was very light pressure, frankly. Hey it just depends on whether you hit a rock down there or not. This is really loosely consoladated. This regolith is loosly packed.

CAPCOM Okay was that index on 6?

DUKE That's affirm. Going to 7.!

YOUNG You don't mind if I put these bags in your seat do you Charlie?

DUKE Not a bit.

DUKE Hey turn the big eye to the right Tony
and if you want to watch this other one.

CAPCOM Okay we're coming around.

DUKE It seems a little more firmly packed
here.

CAPCOM Okay.

DUKE Okay that one bottomed out now.

CAPCOM Good. show

DUKE It -- oh it's up above the red mark.
And it got progressively harder. So I think that was a good
a good reading. I don't think that was necessarily a rock
down there.

CAPCOM Good show we finally guessed right.

DUKE Okay going to 8 and I'm going down slow.
John this -- this crater over here looks like it might be,
this down slope here looks like it might be one of the Cinco's
and it could be Descartes material because it's just some little
blocks around it. And there's some little blocks inside the rim
too. Okay. Here we go.

YOUNG Okay Houston. I'm digging a exploratory
trench right here to see -- material is black.

CAPCOM Okay we copy that John.

YOUNG Now sure enough I mean the material is not
white it's just the same as at --

DUKE Oh rats. How'd you like that?

CAPCOM Beautiful maneuver Charlie. What do you
do for an oncore?

DUKE Okay this thing is -- Okay I went (laugh)
I went down it -- that one bottomed out.

CAPCOM Okay we saw that.

DUKE But it went all the way in. I don't mean --
I mean the force.

YOUNG Okay Houston I've gone down about shovel
width and it's all the same material. And I don't see any
layering in it or anything.

CAPCOM Okay we understand that John.

DUKE Okay I've gone to number sequence to
number 9 and I'm storing this beauty.

CAPCOM Okay.

DUKE And that one test down hill was on the
deepest part.

CAPCOM Okay.

DUKE Tony when I push that beauty in here I
almost turned the Rover over. Tony do you want this Double core
in the ditch here or down slope where I think is probably
closer to Descartes?

YOUNG Okay Houston. I've got a sample out of
the deepest part of this trench that I'm digging and it's
going into bag -- bag 399.

CAPCOM Okay bag 399.
DUKE Did you copy that, Tony; my question?
CAPCOM Right Charlie. Why don't we just go ahead
and take it down slope there (garble).
DUKE Okay, will do. Hey John I'm going to come
over there --
YOUNG What do you need Charlie?
DUKE and get a couple of cores from you.
YOUNG Okay, I'm going to leave those two cores in that
bag it makes it stand up.
DUKE Yes that great. And the lower, upper.
YOUNG I wish I could say these rocks look
different Houston, but they don't. They look --
CAPCOM Okay we understand. Do you see a blocky
rim crater within walking distance?
DUKE Blocky rim.
YOUNG Blocky rim.
DUKE But (garble).
YOUNG How about right up there Charlie?
DUKE Yea that was one right up there yes.
Yea that's 30 meters away up there. Getting out of this
old crater is pretty, pretty hard, but after that it's -- I
think you'll be able to hack it.
YOUNG Hey I've got an upper and a lower.
DUKE You guys looking at the scenery?
CAPCOM We sure are. It's really outstanding.
DUKE Pretty view from up -- have you seen the
Lunar Module? You shoot 12 o'clock right now on the TV.
YOUNG How much, how much time we got here?
CAPCOM Okay you've got about 22 minutes left.
DUKE (garble) we've got 58 total, John.
YOUNG Okay.
CAPCOM No we don't have the resolution to see
the LM.

END OF TAPE

CAPCOM No, we don't have the resolution to
feed a LM.
YOUNG Charlie, get a picture of the
LM.
DUKE I did with the 500.
YOUNG Okay.
DUKE Don't pooh yourself, John.
YOUNG I'm doing your work, Charlie.
DUKE Good show. Okay, yellow double core is the
symbol. Tony, you can't win. The regolith you see, full
bright speckles are looking at you and I think it's a glass
particles that John has already sampled so -- some of them.
YOUNG Okay, Houston. Here's some blocky rim
secondary. Here's a nice little one.
CAPCOM Okay, John, that might be a good place
for your rod. We're really looking for one where the rock
around the secondary rock around the crater should come
from the crater not from the secondary.
YOUNG Yeah, I would dispose it all of them --
Do you think all the blocks on the upslope side were the
secondary that made it -- don't you reckon? Is it from
South Ray? Let me go down and sample off the rim -- off
the South Rim.
CAPCOM Okay, sounds good.
YOUNG I think you really need a primary
impact crater to avoid the problem.
CAPCOM Perhaps you're right, John.
YOUNG Tony, mark me down for one more.
YOUNG Mark me down for one more blow. I'm
trying to get the dust off. Man, I don't want to get down
there too far. That thing is deep.
DUKE Okay, Tony, I'm to the 2 o'clock to
the 2:30 position of the Rover, and I'm going to start
with this double core cut into symbol. Okay, I pushed it
in. I almost -- well, I did. I got in up to the -- almost
to the top of the first dim by pushing it in.
CAPCOM Okay, understand.
DUKE There comes your 7 footer called sun and I'll
get you a locator. I'm just going to get you a locator
not a downslope. It won't be on the ground. Procedurally,
that's a little wrong, but I'll do it anyway.
CAPCOM That's okay.
DUKE I need some work.
DUKE I've hammering on the railroad. Okay
Tony, about halfway up the second one, I guess, it's get-
ting a little bit harder but it's going on in.
CAPCOM Okay. Maybe we're getting down to

CAPCOM Descartes there.
DUKE That might be. Boy, those rays from South Ray you can just track right across through Stubby right on up to Survey -- You know, Tony, South Ray was mapped as the biggest crater in North Ray and it's not nearly as big. It's just the ray pattern -- the whiteness that makes look as big.
YOUNG No, Charlie, it wasn't.
DUKE It was not? Oh, I thought it was. Excuse me.
YOUNG Was when we started but when they got -- when we got --
YOUNG Okay, Houston, I'm standing on the rim of this crater over here. The only -- the only rock I see on south rim of this -- of this obvious secondary is -- is not too big. I can get down into crater and look down in it and see if I can scratch away to a bench if you'd like to do that.
CAPCOM Okay. I don't think we need to do that, John. Charlie will bring up a rake there and maybe from that, we'll be able to get Descartes.
DUKE I'll bring up a rake. Thanks.
YOUNG Are getting a rake, Charlie?
DUKE I'm getting it. I'm finishing up the double core right now. I got it back here and I'm taking it apart.
YOUNG Okay.
DUKE Capped, bottom section.
CAPCOM And, Charlie, did you call off the section number?
DUKE Getting that rock again is going to be --
DUKE No, not yet. I'll get them.
DUKE Okay, that's full. Bottom section was 38, Tony.
CAPCOM Okay.
DUKE Man, this is working neat. Thosethings are just going right back on.
YOUNG (garble).
YOUNG What I'm going to do, Houston, is get a basalt sample off this rim. I -- that's the only thing I can be assured of at Descartes right at this point.
CAPCOM Okay.
YOUNG (garble) That's going in bag 400.
CAPCOM Okay, Babe, 400.
DUKE Okay, top section, Tony, is number 43.
Air zone.
YOUNG Certainly.
CAPCOM Okay, Charlie, is that 23?

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DUKE 43, 4-3.
CAPCOM Okay, copy.
DUKE Okay, from this static point, Houston, I'd
to shoot a pan --
CAPCOM Have at it, John?
DUKE It might be able to make some stereo.
might be able to make some stereo with it.
YOUNG I tell you, this is a graphic illustration
of a secondary from South Ray though, and it would show
up good if I could bend over good enough to get it. Okay,
Tony, the double core is on the mass C are finished.
CAPCOM Okay.
DUKE Do you really want me to grab the rake,
Tony? I got to go help John?
CAPCOM What are you getting at, Charlie?
DUKE Okay --
CAPCOM Yeah, we'd like you to tape the rake on up
there.
DUKE Okay. I'm putting it together now.
DUKE Fred Hays gets a 6 month supply for
thinking of that -- ray thing. That is really neat. I'll
tell you one thing, we sure are up in the air.
YOUNG Yep.
YOUNG I told those guys at the VAB we were going to
be 200 feet under than they are we're a lot higher than the VAB.
CAPCOM That makes a pretty good picture standing
up there. The big eye is on you.
YOUNG Roger. I'm just trying to figure out --
Doggone it, Do you know where we landed? Charlie, ALFA 81.
DUKE What?
YOUNG Charlie, ALFA 81.

END OF TAPE

DUKE Charlie, Alpha 81.
 YOUNG What?
 DUKE Starting Alpha 81. We're about 200 meters north of double spot. Yes, there's Double Spot.
 YOUNG Darn right.
 DUKE Exactly north of Double Spot, John.
 YOUNG Well, I'll be doggoned.
 DUKE This is where the (garble) were going to land.
 YOUNG I knew we made some kind of a mistake.
 DUKE Hey, this is tough going here. This is absolutely remarkable. Hey, John did you make those little footprints here around this thing.
 YOUNG Yes, I guess I did. I came across that little ridge there and I don't advise you to get out in there either.
 DUKE It's really steep. Okay, where do you want this -
 YOUNG on the rim, Charlie.
 DUKE Why don't we get outside the rim. That would be definetley Descartes right down here.
 YOUNG Okay, the object is to get the stuff that's been knocked down to the ground and landed on the rim.
 DUKE Yes, I know, but I thought that we could say that that would be definetely - oh okay, now I'll sample right up here. That's a definite secondary right there isn't it?
 YOUNG Boy, I mean to tell you if that's not (garble) I never saw one. Hank Moore would love to see that.
 DUKE Yes, let me take it easy. That was - I'm pooped.
 YOUNG Yes, just slow down, let me get the rake sample, Charlie. Okay.
 DUKE There's a lots of goodies right there on the inner rim.
 YOUNG Yeah, that's where I'll rake right there.
 DUKE Okay. Don't fall into that mother. Excuse me.
 YOUNG Pretty good sized isn't it?
 DUKE Yes. Here let me have the shovel.
 Okay, I got it. That's a clod. That's an inundated clod.
 YOUNG Here's some rock.
 DUKE Good deal, boy. That's great. Let's fill this one up and then - hey John, watch it.
 YOUNG Is that okay for you?
 DUKE Wait a minute. Super. Got every one in there.
 YOUNG Real dust covered, mostly centimetered size, Tony, about 15 frags, some small than that. I've already got my shovel full here Charlie.
 DUKE Okay.

DUKE Of the dirt?
DUKE I hate to tell you this, but I think it's
indolated regolith.
YOUNG Fine.
DUKE Cause I'm just breaking it up.
YOUNG Very pliable, Houston. Like dust dirt
clouds.
DUKE Which is probably what it is.
YOUNG You going to get another one?
DUKE Yeah, can you try another one? You copy
that, Tony?
CAPCOM Say again, Charlie.
DUKE I don't think that these are rocks, I
thinks if they are they are very pliable, I think it's just
indurated regolith.
CAPCOM Okay, we copy.
YOUNG Well they're may be a rock or two in there.
DUKE Wait a minute you got to get them all to
one corner, John, there you go.
YOUNG Okay.
DUKE That one got it.
DUKE Maybe some of them are rocks.
YOUNG Okay, Houston, that was 3 scoops and we're
not documenting this to the best of our ability, because, I
think we're standing too close to the rim, here to ----
DUKE Downsun I'd be in big hole.
YOUNG Charlie, goes downsun to take the picture
we're in trouble.
CAPCOM Alright.
YOUNG (garble) as long as you're in the pan.
CAPCOM Right we see it.
YOUNG The locator shot will be in the pan and
I'm going to shoot this --- is an upsun after of a rake sample,
stero.
DUKE That was in bag 401, Tony.
CAPCOM Okay, 401.
DUKE Yeah. Okay, Tony, you want us to get the
----we can get this rock here for the padded bags, there's
plenty of them around, but they're probably be out of South
Ray. All these blocks that we see here came out of this secondary.
YOUNG Yeah.
DUKE Everyone.
CAPCOM Okay, we copy that.
YOUNG We'll collect the padded bags (garble)
Rover, there's no point in going back up there.
DUKE Okay, well that's what we're going to do.
I just wondered if secondary was okay for you.
CAPCOM Okay, we're getting them to work it.

CAPCOM We will need a second pan in the area of the penetrations there.

DUKE I'll do that. Boy it is lose, on your footing here, John, feels like I'm really sinking in.

YOUNG Charlie, you really are.

DUKE Boy is this ever neat. (laughter)

YOUNG Just figure out some way to keep my hands closed. Man that's the hard part about it, isn't?

DUKE You know, John, that black stuff is glass, on those rocks.

YOUNG Sure it is. That's what I said.

DUKE Yeah.

CAPCOM Okay, fellows we'd like for you to get your packed up there. We'll save the padded bags for later.

YOUNG Okay.

CAPCOM And your Gyro is good.

DUKE I think we have enough rocks from South Ray.

YOUNG Okay.

DUKE I got to get one more view from up here. John, I'll take the pan from right here.

YOUNG Okay, I'll go ahead and pack up, Charlie.

DUKE Okay. Okay, lets see how do I do this.

That's 11 at 74 hmmm ----

YOUNG Click --- click ---- click

DUKE Okay, Tony, do you want me to change the mags on 16, it's about empty.

CAPCOM That's an affirmative.

DUKE (garble) per second run it through there.

CAPCOM Right, go ahead.

DUKE Okay, will do.

CAPCOM Should be mag R.

DUKE Okay, man if I get this --- top of this one it's going to be a miracle.

PAO Duke is taking a series of panoramic photographs here.

DUKE moved about 2 feet down slope so, I don't know if things are going to match up too well or not.

CAPCOM Ah, we'll make it work.

DUKE Okay.

DUKE And after that pan I'll be leaving here with frame count 110.

CAPCOM Okay, Charlie, 110.

DUKE You, dog you.

YOUNG Don't drop it, Charlie.

DUKE Yeah, I got it.

YOUNG Get down slope here and it's a piece of cake. There it is.

CAPCOM And we'd like you PLSS check before you take off.

DUKE Okay, I'm reading 385.

DUKE No flags. Down to 68% on the 02. Make that 63%, no 68 was right. And I'm on inbay between intermediate and minimum cooling.

YOUNG Okay, I'm at 70%, clear flags, 3.85 and I got a --- just out of inter---just out of medium, correction just out of min. I got it now.

DUKE Okay. I think the fact that we didn't run across any white soil may be significant around here. Tony what -- how's the metabolic rate look there?

CAPCOM Okay, you all look very good.

DUKE Okay, thank you. Okay, and as we leave Brinko crater, bid a fond farewell.

CAPCOM Okay, and John, we'll need a frame count from you.

DUKE Okay, Tony.

END OF TAPE

YOUNG (garble)
 CAPCOM Okay, and John, we'll need a frame count for you.

DUKE Okay, Tony.
 YOUNG Okay, my frame count is 76 magazine Charlie.
 DUKE John, could you give me magazine Romeo.
 YOUNG Yea.
 DUKE Hey, Tony. I think on this next one, we ought to stop away from any boulders down at 5, and so we can get some Descartes.

CAPCOM Right, we're -
 YOUNG (garble) you got Romeo from, Charlie.
 DUKE Yea, that's fine.
 CAPCOM We agree, that station 5's the key station now. We have a pad vector to get you to the crater you called out on the way up, but it's up to you on what you think is the best place to be sure of getting Descartes.

YOUNG We've got you.
 DUKE Okay, we could move 40 feet or 50 meters down slope and I think we have Descartes. We'll look. Okay, ready, John.
 YOUNG Yea, I've got the frame count. DAP's mags R. The other bags we're skipping. Okay DAC FA 250.
 DUKE I got to change that.
 YOUNG Okay, going mode switch to 1, Houston, and a TVCW.

CAPCOM Okay, that's 50 meters down slope you described. Is that a blocky rim crater and why do you think that -
 DUKE Tony, I can see that one down slope that you wanted us to stop at station 5. It's - it won't be any trouble getting there, but if you give us a vector that'll be certain.

CAPCOM Okay. Vector will be 352 heading and
 DUKE (garbled) Okay.
 CAPCOM Does that look like the best bet to you?
 What we're looking for is primary impact.
 YOUNG Charlie.
 DUKE Say again.
 CAPCOM What we're looking for is a primary impact at Blocky Rim Crater.
 YOUNG Understand.
 DUKE Suppose we give you a primarily impact with no block?
 YOUNG (garbled)
 CAPCOM And we don't want one without blocks. It almost has to be blocky.
 YOUNG Are you already to go, Charlie?
 DUKE Yes sir. Strapped in. Let me turn the camera off. Hey, now watch my arm now. Okay. Don't hit my arm. Okay, wait a minute. I don't feel it.

YOUNG Now then.
YOUNG Well, let's get it next time. Must not have a mag in there right, cause it's not running. Can't fix it without getting out.
YOUNG Don't, Don't. Let's worry about that when we get to the station.
DUKE Tony, the camera's not running this time. I'll fix it when we get down to 5. You won't miss much.
CAPCOM Okay, fine.
PAO This is Apollo Control. We are allocating about 7 minutes for this ride to Station 5. It is difficult to determine at Station 4.
DUKE 40.
PAO Difficult to determine at Station 4, if any Descartes material was sampled that will be particularly interested to get something that punched through the ray material from South Ray into Descartes formation.
DUKE I think at 7 tenths we are starting at 40 52. Hey, what should our bearing and range be back at the LM, Tony, when we get that crater.
CAPCOM Okay, it'll be 3
DUKE 1, we can't --
CAPCOM That'll be 3 54 at 3.4.
DUKE Okay, we're headed 3 54 and going - that thing is taking us straight for the LM, John. Down slope is easy.
YOUNG As long as the brakes hold out it should be easy, Charlie.
DUKE Yes. Have you got the brakes on.
YOUNG Partially.
DUKE Isn't that something.
YOUNG Have too.
YOUNG Okay, what was the heading and distance of that?
DUKE 3 54 for 3.4.
YOUNG You know, it really wasn't apparent we were climbing this steep a slope.
YOUNG 3 54 for .4.
DUKE 3.4.
CAPCOM Okay that's the bearing (garbled)
DUKE Was that -- bearing in stop 5.
CAPCOM Okay, the heading and distance is 3 52 0.7.
DUKE Okay, we got a 3 54 bearing back to the LM right now so we'll just keep on that.
CAPCOM Okay, sounds good.
YOUNG And Johnnie, you're doing a great job.
DUKE Okay, Tony, coming back down slope 3 54 and 3.8. That's about the same stuff.

CAPCOM Okay.
DUKE Hey, we're about to cross our tracks.
We're going back down our tracks, Tony.
YOUNG Only way to fly, Tony.
CAPCOM I understand.
YOUNG Charlie, you said you were going to see
some other tracks on the Moon.
DUKE Yep. That big crater I was thinking about
is right back there, looks like.
YOUNG No wonder we rake the pitch meter. Just as well
we did.
DUKE Yeah.
YOUNG Ya-ho-ho-ho. Look at that baby. I'm
really getting confidence in it now. It's really humming
like a kitten.
DUKE Oh, this machine is --
YOUNG Yes.
CAPCOM Probably a good idea you couldn't see
how steep it was going up.
YOUNG Darn right it was.
YOUNG Okay, I got the power off and we're making
10 kilometers an hour. Just falling down our own tracks.
DUKE Hey, Tony, I'm keeping my eye out for a
blocky rim one.
YOUNG Oh, Oh.
DUKE Almost spun out.
YOUNG How about this one right here, Charlie?
DUKE Yep, that's it, John. That's a good one.
DUKE Okay, it's stop 5. We're supposed to park
CAPCOM 180.
DUKE 180. Say again, Tony.
CAPCOM I was just saying 180.
DUKE Say again.
YOUNG Rog.
DUKE That doesn't look like a secondary, John.
YOUNG I doesn't look like one to me either.
Well.
DUKE It might be a primary impact, but I think
those blocks are or rocks there are from South Ray. Think
we ought to get a rake sample here.
CAPCOM How big is that crater?
DUKE About 15 meters across.
CAPCOM Okay, understand 15 meters.
DUKE That's affirmed. Okay, we're parked right
on the rim of it, we'll let you see.

END OF TAPE

DUKE That's affirm.
YOUNG Okay, well we're parked right on the rim
of it, we'll let you see.
CAPCOM Okay.
DUKE The biggest blocks we see Tony, are about
50 centimeters, or bigger, and they're in the bottom and all
over the crater -- no preferred orientation.
DUKE Okay, we parked at 174 353 5.9 3.5 100 100
YOUNG Okay,
DUKE Excuse me, John. 65 65 190 105 all scale
low and all scale low -- Wow!
YOUNG In -- in a hole?
DUKE No, it's downslope for me over here.
YOUNG It is?
DUKE Yeah.
YOUNG Me too, Charlie.
YOUNG Fact is, let's bring the Rover back up here.
DUKE Well, I'm out -- I'm not getting out again,
and get back in.
YOUNG I don't mean that. I mean let's bring the
Rover back up here.
DUKE Oh, you want to pick it up, huh?
YOUNG Yeah.
DUKE Okay.
YOUNG Hey, now, we got to swing it around --
YOUNG There we go.
DUKE Okay.
YOUNG That's more like it.
DUKE Didn't run --
YOUNG What did you say?
DUKE Didn't run. The camera didn't run.
DUKE X is still there. Film looks good.
YOUNG Okay. (garble) pitch to 2 --
DUKE Hey, now, it's working.
CAPCOM Okay, we've got a picture.
YOUNG Got the Earth in the tube.
YOUNG Okay.
CAPCOM Okay, and while you're brushing off the
look through there, make sure you do a good job -- we notice it
seems to be heating up.
YOUNG I've been doing a good job.
CAPCOM Okay, understand.
DUKE I'll vouch for that Tony, honest.
CAPCOM We believe you!
CAPCOM Our best bet here at this crater is to look
for a rounded, as well as angular -- the angular boulders are
probably from South Ray, and maybe the rounded ones are working
their way out of the regolith here. So that may be a cue to our
getting Descartes.

DUKE Good point,
 YOUNG Roger.
 YOUNG Well, I'll tell you what, if we do a rake
 sample in the wall would probably be our best bet.
 DUKE That's what I would like to do.
 CAPCOM Okay, let's try that.
 DUKE You know, John, looking back I can't even
 see our tracks.
 YOUNG They're back there -- I guarantee you.
 DUKE I know it.
 DUKE Hey, we've come a long way! I thought
 this thing was right next door to us!
 DUKE That rake is sure a great way to get a lot
 of rocks in a hurry.
 YOUNG Yep, sure is.
 DUKE Boy, I tell you, even South Ray looks like
 it's accessible.
 YOUNG I'd -- I'd hesitate to say though. There
 may be blocks down there that won't quit.
 DUKE There's some big black ones. See those big
 black blocks there, John, -- and on the side of it, and then
 there's some big white ones there too. The black ones are the --
 YOUNG It almost looks like we could just go right
 down there and right up on South Ray, doesn't it? -- No we
 couldn't.
 DUKE I don't believe they're going to let us,
 but it looks it, I agree with you.
 YOUNG Don't think we could.
 CAPCOM Judging by the blocks here, I sure don't
 know.
 DUKE Alright Tony, this is -- they aren't bad here.
 This Rover takes 'em like -- I don't think we're going to need
 forty minutes here, I'll tell you. We oughta spend some more
 time somewhere else.
 YOUNG Let me get the rake samples.
 DUKE Okay.
 YOUNG That's 11 and 11.
 DUKE We could go out to -- okay, go ahead, pick
 a place -- I'll get the gnomon -- you're going to get it? Okay.
 DUKE Okay, our little note here in the checklist,
 Tony, doesn't mean too much. We seem to be on a bench here
 that's about 50 meters wide and the slope here on the bench
 is only about 2 degrees -- maybe 3 or 4 degrees -- maybe 10 --
 no, about 5 degrees I'd say.
 YOUNG And Houston, heres about a foot and a half
 across secondary -- pri--looks like a primary, that cut into
 the rim -- the upper rim of this 10 or 20 meter se -- this a
 yeah, this 20 meter secondary. How about sampling out of the
 wall of that one?

DUKE John, I don't think this big crater is a secondary.
YOUNG That's what I mean.
DUKE That little one is.
YOUNG This little bity one is probably a primary 2 -- because look how the -- look at the glass on the bottom, man, you've got to have velocity to do that!
DUKE Yeah, I agree.
CAPCOM Okay, does it look like it knocked out any rocks, Charlie.
DUKE Okay.
YOUNG Yeah, I don't think the rocks that are there were there because of --
DUKE Yeah, it does John, there's some rocks right in that corner there, right by your footprint.
YOUNG Oh, yeah, right by my footprint.
DUKE See that one right there -- by the other leg?
YOUNG Yeah.
DUKE And here's one right in the very bottom.
DUKE Why don't you get that scoop going, and I'll go over here and get a locator.
CAPCOM Okay, sounds like a good plan.
CAPCOM And we would like a documented sample of a glass-covered rock, if you can find one.
YOUNG Okay, well, we've got several -- we already picked up a couple of beads for you, but we didn't document them.
DUKE Now that's a good bag full --
YOUNG Yeah.
DUKE -- one scoop.
DUKE Want me to do it again?
YOUNG Notice the color of the material, Charlie, in the bottom of it -- it's white.
YOUNG We get a kilo of soil.
YOUNG That's what this is -- this isn't rocks .
DUKE (garble) full?
YOUNG That could be Descartes, Charlie!
DUKE Hey, Tony, that rake sample was in 332, and I just by ac-- with an experiment pinched one of the rocks and it all -- it broke.
CAPCOM Okay, we copy that.
DUKE It'll probably be a bag full of soil when we get it back.
CAPCOM Well, that still may be Descartes.
YOUNG It may be.
DUKE I think it is.
YOUNG The lower material in the -- in the crater is -- want another one -- lighter albedo -- muchlighter albedo and if I had my druthers (garble) it's somewhere between the gray and the white

YOUNG out on the plain.
CAPCOM Okay.
CAPCOM That's good John, it's about a Kilo.
YOUNG It's somewhere between the gray and the surface, and the white material that we picked up out on the plain. About -- we got a bag full of most of that -- under -- from scooping underneath the rock samples.
CAPCOM Okay, and after this, we would like you to move to the rim of the main crater, and spend some time just describing the rocks you see, and then sample the rim.
DUKE Okay, I think -- uh --
YOUNG There's one of those glass jobs, Charlie, right there -- there -- right there.

END OF TAPE

CREWMAN (garble)
 CAPCOM Okay, we'd like a documented glass sample, if you have a chance.
 YOUNG That wasn't big enough to document.
 CAPCOM Okay.
 DUKE But we'll look for a rock that's glass coated, Tony.
 CAPCOM Okay, fine.
 DUKE If we really need a sample on the upslope side of this crater where its shielded towarded South Ray the wall if it wasn't caused by South Ray then we'll ought to be looking at the real Descartes.
 CAPCOM Okay, that sounds like a good idea.
 YOUNG That's a good plan.
 YOUNG Hey Tony, that - here's a glass covered one John right here.
 YOUNG Okay.
 DUKE Remember that right by this footprint.
 YOUNG Right where I stopped walking.
 DUKE Man, you're going to get me down in that crater.
 YOUNG No I'm not.
 DUKE I'm not going to get down in front of that.
 YOUNG I don't think you ought to.
 CAPCOM Just forget the downside.
 DUKE I'll just forget the downside okay?
 DUKE Now, the only rocks we see are really angular and they're on this rim and I - I guess the problem is it was a crater event was probably so long ago, there's just no not even a hint of any ledges or bedrock in this rascal. John, why don't you take the rake right here in front of the - no I already documented that area and see what you get.
 YOUNG Take the rake what Charlie?
 DUKE And just right here in front the gnomon and see what you get. One scoop - it might be - I've got the pictures.
 YOUNG You do huh?
 DUKE Yeah.
 YOUNG I don't think you're going to get anything but soil (garble) to.
 DUKE No, there is some rock.
 DUKE Two.
 YOUNG Yeah. Hey there we go. Why don't you hold the bag and let me pour it in.
 DUKE Okay.
 YOUNG Okay?
 YOUNG That'll put me in a better position. No. Well we've got a few of those. Let me try one more scoop full.
 CAPCOM Okay, do those look like clods too?

YOUNG No, they don't. There is at least one of them that's glass coated.

DUKE Hey there's some.

YOUNG These are whiteish type rocks, very small They may have come from South Ray.

DUKE Try one more scoop John.

YOUNG Okay. There's one right under there looks like a good bet.

DUKE Damn, you can get a bunch of stuff with this rake. If this was from South Ray -

YOUNG Look at that -

DUKE All of those are rounded.

YOUNG I know it. If Charlie points up the different characteristics of these rocks that we're just getting right now then maybe that's the key they all they're more rounded than the South Ray crater's rocks are.

DUKE (garble).

YOUNG There's a few angular in there, but then these are mostly rounded and I see some little black glass on one but they're mostly rounded whiteish rocks covered with dust, of course.

DUKE These are a couple of good ones.

CAPCOM Okay, that sounds real good.

YOUNG Okay.

DUKE That's bag 334, Tony.

CAPCOM Okay 334.

DUKE Houston, do you want us to go sample the rim of this thing again - some more.

YOUNG They want us to get a glass coated one of the good one right up on -

CAPCOM Okay -

YOUNG Let's go up there and get it.

CAPCOM Did you get your soil in?

DUKE Do what? Huh?

CAPCOM Okay, have you got your soil there?

YOUNG No we didn't I'll get a scoop full.

CAPCOM Okay, and you're doing so well inside the rim there, we'd kind of like you to stay inside the rim and just kind of work around and see what you can find.

DUKE Okay. Let me get us some soil here.

YOUNG Here you are Charlie.

DUKE You really feel like you're on the verge of instability, don't you.

CAPCOM That's probably only because you are, you are getting close Charlie.

YOUNG There's 100 hundred kilos. Okay, that's 100 kilos that's going into bag 402.

CAPCOM Okay, bag 402.

YOUNG Hope you're able to document it with the TV because we stepped all over it.

DUKE Tony, these after pictures are going - on

DUKE this kind of terrain you're bouncing so much trying to keep your balance that you just sort of obliterate whatever you've picked up, the place you picked it up.

CAPCOM Okay. When you dig down you're not getting any of that white soil is that right?

YOUNG (garble).

YOUNG That's correct, we're not. I kicked some of it away to see just how -

DUKE Hey John?

YOUNG Yeah?

DUKE Here's an old old rounded rock that's fractured badly beat up, let's get that one. Can you give me the - get your -

CAPCOM That's what we're looking for, Charlie.

YOUNG Charlie, I was going to say take a picture of that.

DUKE This gnomon worthless, it's against the stops.

YOUNG That one right there?

DUKE Yeah, that one right there.

YOUNG Okay, I'll get -

DUKE That's all we're going to be able to get.

YOUNG It's sort of an up Sun.

DUKE Man, I'm feel like I'm -

DUKE I'll shoot these at 5/6, Houston -

YOUNG (garble) up Sun, you can, I can get the location all right.

DUKE Oh, don't worry about that, John.

CAPCOM We can get the location off the TV.

YOUNG Okay. It was an old rock wasn't it, it crumbled to pieces. That was fruitless there.

DUKE Get that right there.

YOUNG I am, I'm trying to get up slope on it.

DUKE Hand me the rake, I can get it.

YOUNG Careful, Charlie, there we go.

DUKE Uh oh, okay, I've got it.

CAPCOM Okay, and the white rocks that you picked up and the ones you just have here, can you see any crystals in it?

DUKE Yes, sir, I sure can. It's a bluish crystal, a couple of millimeters' sized.

YOUNG Bluish.

DUKE Well, that's what it looked - grayish maybe - and it's got - one corner of it's got a glass rand on it about 1/2 of a centimeter thick.

CAPCOM Okay, we copy that.

DUKE It looks like - it doesn't look like a breccia Tony, it looks like a crystalline rock.

CAPCOM (garble).

YOUNG It's got a lot of - it's fine grained -
it seems to be a fine grained crystalline rock anyway, the
part that we can see. The particles in it though are milli-
meter size though. I see some millimeter size sparklies
flashing at me.

DUKE That's going into bag 403.

CAPCOM Okay 403.

DUKE Hey, John - why don't we get that - keep
that - I'm about to strike out on this rake, here I can't
I can get a couple of little ones each time, but -

YOUNG Okay -

DUKE - that's about it.

DUKE Do we want to move on around there about
10 feet or so.

YOUNG Okay, let's pick a spot

END OF TAPE

DUKE Want to move over around there about
10 feet or so.

YOUNG Okay, pick a spot. I'll follow in your
tracks.

DUKE Your sliding downhill about 2 inches every
time you - I can't get going, here. Look at that glass covered
one right there, John.

YOUNG Okay, let's get it, Charlie.

DUKE Okay. Okay, I'll back off and get the
cross sun, here.

YOUNG Yes, I'm going to have to get an upsun,
here. I'll have to do a lot of work. Gonna need just one
rock and one bag, here.

DUKE Hey, Tony we just picked you up a glass
rion rock at least a quarter of its got glass on it and its
so dust covered that it -

YOUNG Defy's description.

DUKE Laughter.

YOUNG 404 is the bag number.

CAPCOM Okay, bag 404.

DUKE Still got us on the big eye.

CAPCOM We sure do.

DUKE Yes, they do.

YOUNG Close the top, Charlie.

DUKE Okay. Let me try a rack here - let me
get an after.

YOUNG Get an after, Charlie.

DUKE Okay. Got it.

YOUNG Here, let me rack up here. These aren't
clods or -

YOUNG Be careful, Charlie.

DUKE That was a whiteish rock, that one came
from South Ray. Wait a minute. Here's some good ones, dusty
ones.

CAPCOM It's sure a good thing we had that (garble)

YOUNG Little rocks.

CAPCOM Go ahead, John.

YOUNG There's a round one, Charlie.

DUKE Hey, there's a great one, John. There's
a good rock right there.

YOUNG I don't think this is going to be a simple
problem, even after you.

CAPCOM We concur John, we sure do.

YOUNG He gets the wrong bag because it's so dark.
It's 405.

CAPCOM Okay.

YOUNG Going into bag 405. That's a big round
rock. It's dust covered, I see white streaks through it and
I can't tell from the glass showing through that I can see
what it - I don't know whether I can see any glass on it or
not. But it's a friable white rock, and it's rounded.

CAPCOM Okay, we copy that.
 YOUNG Going into bag 405 with Charlie's rack sample.
 CAPCOM Okay.
 YOUNG You see because there is so dog gone many craters around here.
 CAPCOM Right, understand. We'd like you to find the steepest slopes that you can work on there, and dig as deep as you can with that rack.
 YOUNG Let me do that, Charlie.
 DUKE We're on it right, now, babe I'll tell you.
 CAPCOM Okay, can you dig into the face of the slope up there.
 YOUNG Charlie, let me do that.
 DUKE Okay, I'll swap with you.
 YOUNG Hold the gnomon.
 DUKE Okay.
 YOUNG Watch it now.
 DUKE How about right up here, John, here's a big steep part or right over there where we walked from. Where you going?
 YOUNG On the steep slope.
 DUKE Okay, right to your left is a good one. Right where we been.
 YOUNG Steepest is closest to the rim.
 DUKE That's right, right up there.
 YOUNG Man, you don't make much headway. Great job.
 DUKE Okay, Tony, he's gone vertically into the wall, about a foot and it all looks the same. Occasionally you see a white splotch.
 CAPCOM Okay, can your rack pull out any rocks - in there, take a rack sample down in the hole there.
 YOUNG Just a minute.
 DUKE Hey, John I tell you what. Let me get upslope.
 YOUNG Move it out of the shadow, Charlie, I can't see it.
 DUKE Okay, that's how you go. Wooop.
 YOUNG One thing about being on a 20 degree slope you can get down on your knees.
 YOUNG I think that's going to be the name of the game until we get a -
 DUKE Looks just like just inderated regolith, doesn't it. I don't see any rocks.
 YOUNG Here, let me do this. There's one.
 DUKE Yes.
 YOUNG There's some.
 DUKE Okay.

DUKE Yes, their rocks alright. Going in bag
335 - three little ones, Tony.

CAPCOM Okay, we copy that.

YOUNG Charlie, their clods.

DUKE And their clods, not rocks.

CAPCOM Okay.

DUKE But, anyway, 33 - 335, did I say 331 or 335.

YOUNG You said 335.

DUKE Hand me the rake, here let me try.

CAPCOM You think the rock concentration near the
surface is a light surface, then.

DUKE Apparently so because in this wall here we're
not getting a thing.

CAPCOM Okay, why don't you take a soil right,
there - fill up a soil bag.

YOUNG This could be a south ray, of course,
that's down slope too. There are two rocks right there.
Hey, Charlie I'm going to put this one in your bag before I
can get it.

DUKE Okay.

CAPCOM And, we're going to have to press on after
this sample.

YOUNG Okay. 20 minutes to get back to the rover.

DUKE Oh, you need this don't you?

YOUNG Yes.

DUKE Get your soil - they want a soil bag full.
I hate to waste a bag on that one, but -

YOUNG I tell you what, let's put the soil in
there first. Bag 406 will have one rock and a soil sample
from this low area.

CAPCOM Okay, sounds good.

DUKE Let's go up the bay.

YOUNG Okay.

DUKE Let's go up to bay.

YOUNG Okay.

DUKE And, Tony, a lot of this soil is coming
out from about 6 inches down.

CAPCOM Okay.

DUKE Out of this crater. You know, John, I
think if we got a running start straight at the rover we'd
make it up the other side.

CAPCOM Go the other way.

YOUNG Let's go around the rim.

DUKE Okay.

CAPCOM Okay, the plan back at the rover is we'd
like John to take a LPM measurement and Charlie if you could
sample around the rim there near the rover and take both
angular and round whatever you find.

DUKE Okay, sure will. Do you - okay.

APOLLO 16 MISSION COMMENTARY 4/22/72 CST 1:25 GET 145:42 MC547/4

CAPCOM Yes, we'd like an LPM. Incidentally your
magnetic field is about 130 gammas back at the LSM.

END OF TAPE

CAPCOM We'd like a LCM. Incidentally magnetic field there is about 130 gammas back at the LSM.

YOUNG How is it at the site measurement, does it agree with that?

CAPCOM Okay, I believe it was about 20 gammas less, something like that 110 gammas, plunging pretty steeply.

DUKE Hey, John, it's easier to go straight across. That was fun.

YOUNG I haven't had any trouble.

DUKE Okay.

DUKE I had a tough time walking up there on the side.

YOUNG You got big feet today, Charlie.

YOUNG Oh, no. Going 45 feet on LPM route that'll put me over the edge here. I'm going to go out at right angles to the Rover, around this crater rim, for this measurement, Houston, it may not be exactly 45 feet, but it'll be close.

CAPCOM Okay. That sounds good, John. And, Charlie we'd like some fist sized samples here.

DUKE Okay, we got a ton of them. We'll get them for you.

CAPCOM Good show.

YOUNG Okay. Lots of luck with that LPM.

CAPCOM And, John, why don't you take a pan when you document the location of that LPM tripod. That'll take care of our pan.

YOUNG That's a good idea. All right fine good head.

DUKE I already took one pan.

YOUNG Well they want another one.

DUKE Okay.

YOUNG Okay, the read switch is going on. Not the read switch, the ON switch, the side switch. Mark.

CAPCOM Okay, we got it. Charlie, where did you take your pan from?

DUKE Uh, hmmm, on the south rim of that crater.

CAPCOM Okay.

DUKE About 10 feet, to the 4:00 position of the Rover.

CAPCOM Okay, John, I guess we won't need a pan, if you just get the LPM.

YOUNG A'll all right.

CAPCOM Okay, John, a minute.

YOUNG Wait a minute, I'm deploying it.

CAPCOM Oh, I thought you gave a mark. I understand.

YOUNG Yeah, I did for turning it on. Yeah, I got it out to the white line now.

CAPCOM Okay.

DUKE Okay, Tony, I'm sampling right in front of the Rover. I got a fist size rock out here.

CAPCOM Okay.
 DUKE It's captured in the old tongs. Was captured in the old tongs.
 YOUNG Okay, that's aligned perfectly. Here we go. Okay, now start your minute, Tony.
 CAPCOM Okay, will do.
 DUKE Okay, that rocks going in 336 it's a rounded rock and its dusty and all I can see is some streaks on it, Tony, white streaks.
 CAPCOM Okay.
 DUKE Hey, John, could you throw me the bag, it's under your seat. I'll get it. I'll get it.
 YOUNG I'm going to knock over -- well I'll get it. It's under my seat?
 DUKE I thought so.
 CAPCOM Okay, John, mark.
 DUKE No it's not there it's under my seat.
 YOUNG Okay, the read switch is going on. 563 413 3 wait a minute. 563 415 356 570 424 357 571 425 357 OFF. Okay the power switch is coming OFF.
 CAPCOM Okay, fine.
 DUKE Did you get those, Tony?
 CAPCOM We sure did.
 YOUNG Did you get those, I forgot to ask you. Okay.
 CAPCOM And write her down.
 YOUNG (garble) Write these down. Hey, Charlie where I tripped over here is a lot of white rock.
 DUKE I got some over here, too. Boy, I'm going to grab that one, that's a fresh sharp white rock, Houston, and I have never seen the like of. Very angular.
 YOUNG Ouch. Boy, Charlie, look at this rock. That has got to be plag.
 DUKE Whereabouts did you find it, John?
 YOUNG Right down there in that hole.
 DUKE Oh, yeah.
 YOUNG ... filled up with white rock.
 DUKE Uh huh.
 YOUNG Look at these little crystals in it. No that couldn't be. A big white angular rock and it's --- but all the crystals in in are very small. That is a crystal rock. We going to get that one. That's the first one I've seen here that I really believes is a crystal rock, Houston.
 DUKE Going to put it in a padded bag?
 CAPCOM Outstanding.

YOUNG We'd have to break it into.

DUKE Oh.

CAPCOM No we don't need that in a padded bag.

YOUNG It's about 6 centimeters 12 centimeters long and its got a head on it --- it looks like the head of maybe a viper or diamond back, if you lay it down flat. You won't have any trouble recognizing it. And it's white and when I hold it up to the sun, it has a greenish cast to it. A greenish bluish cast.

CAPCOM Okay.

YOUNG Ah shoot. I see some stray agents in it too. They may be my imagination.

DUKE Okay, Tony, I've got 2 more documented samples in bag 33 or 2 more rocks documented in 337.

CAPCOM Okay, 337. And we're going to have to press on here.

DUKE put this rock under your seat. I'm in.
Okay, John. (garble) I wouldn't do that.

YOUNG I don't blame that pitch meter for falling down.

DUKE Man, I've fallen down twice. Up Hadley.

DUKE The Rover wheels are covered with dust,
John.

END OF TAPE

DUKE The Rover wheels are covered with dust, John.
CAPCOM And, John do you have a bag number for your
white rock, or have you collected it yet?
YOUNG I made a grab sample out of it, Houston.
CAPCOM Okay.
DUKE Too big for a bag, wasn't it John?
YOUNG Yes, it was too big for a bag. It's -
amazing how you can trip over - how you can be going along
and trip over a rock and I'm one of these guys that always
looks down and it's - and I still seem to be able to trip
when I'm going forward.
DUKE Okay, Tony, the samples are complete
here and I'm leaving with frame count number looks about
170, Tony, I better change mags before I - we start out, over.
CAPCOM Okay, sounds good.
CAPCOM Okay, and while you're up there you
might adjust the back, maybe you can get it running.
DUKE I already did and it's running, it'll
be running.
CAPCOM Okay, good show.
DUKE John?
YOUNG Yes, sir.
DUKE That is the best sample we've got.
YOUNG I know it.
DUKE I'll tell you. That is a crystalline
rock if I've ever seen a crystalline rock.
YOUNG First one today.
DUKE Yeah.
YOUNG At least the first one you could say
was one, maybe.
DUKE That is a great rock. Okay, John when
you get around there, could you give me a film mag, black
and white?
YOUNG Okay.
CAPCOM I guess we could call that one a great
John.
YOUNG Oh, come on.
DUKE It's not very big, but it's a nice
rock.
CAPCOM Okay.
DUKE It was made about - it looks about 3 days
old.
YOUNG It must be on the order of 4 billion.
YOUNG Which one do you want Charlie?
DUKE Any black and white, it doesn't matter.
DUKE Wrong pocket.
YOUNG Any black and white.
DUKE There ain't but one, magazine I.
CAPCOM Okay -
YOUNG Are you sure that's a roll of black and white?

DUKE 170, okay. Uh, oh.
YOUNG I got it.
YOUNG There you go.
DUKE Okay.
YOUNG Just slide this in the camera box. Tell
Burns I got dust on it. (garble).
CAPCOM Okay, we can see it works.
DUKE Okay, Tony maga - yeah magazine India.
CAPCOM Okay.
DUKE And starting with frame count number -
about number 3, I guess I've fired off a couple.
CAPCOM Okay.
YOUNG Okay, we're ready to press here.
CAPCOM Okay, and just to make sure you didn't
get any dust on that LCRU, while you're working around there
we would like you to brush it off again, we're really heating
up on that.
DUKE It's clean.
CAPCOM Okay.
YOUNG It is clean.
DUKE It's clean, honest.
CAPCOM Okay, that's okay.
DUKE Do you want to shut it down for a while?
CAPCOM Ah, no, that's all right.
CAPCOM And Charlie on your LRV readout we
won't be needing roll so why don't we just leave that
switch in amps?
DUKE Okay. Got it in amps.
CAPCOM Okay.
DUKE Okay, it's dusted, going downhill,
it doesn't get near as much dust on it as it did coming
up, for some reason.
YOUNG Maybe that's good it was 4 kilometers
one way and 1/2 of one the other, that's the only reason.
DUKE I hope I can get back in this beauty here.
YOUNG You're in.
CAPCOM Okay, we've got the -
YOUNG Don't do anything with the -
CAPCOM - magnetometer reading Station 5 there
is 125 gammas down, the ALSEP sight was 230 gamma, correction
up, the ALSEP sight was 230 gamma down and Spook was 180
down.
CAPCOM Hey, John, do you have switch position 1?
YOUNG No, I'm going to one right now.
CAPCOM Okay, good show.
PAO This is Apollo Control. Young and
Duke have now been on the lunar surface a little over 3
hours and we would have about

END OF TAPE

PAO and we would have about 3 hours and 42 minutes left in a nominal EVA.

CAPCOM So that was a very interesting magnetometer reading.

YOUNG (garbled)

YOUNG Well, I'll give you a good alignment and read the numbers right, but other than that I --

CAPCOM And John --

YOUNG (garbled) should be about -- You'll have to wait. No, I can see it. 96, Tony.

CAPCOM Okay, very good.

CAPCOM And, Charlie, DAC rom--

YOUNG (garbled) we're in and on our way.

It's already on.

CAPCOM Okay. That station 6 will be completely nominal.

YOUNG Ahhhhhhhhhhh.

DUKE Okay, this is 360. It's 2.9. Why don't we just make it 3.5. It's 2.9.

YOUNG Okay, Charlie, I want to follow my tracks down this thing.

DUKE That's fine.

YOUNG Okay, we're riding at idle right now and picking up speed.

CAPCOM Okay, and we would like station 6 at the lowest terrace on Stone Mountain and a blocky crater if possible.

YOUNG Understand the lowest terrace and a blocky crater. Charlie, where do you think Stone Mountain takes off in the (garbled)

DUKE I can see a place down here, see that off to the left, John, by where your tracks came up there.

YOUNG Yeah.

DUKE There's a pretty big crater. With some blocks around it. I think that might do.

DUKE Hey, Tony, what do you estimate one would be?

CAPCOM Okay (garbled).

DUKE The biggest one right down there, John.

12:00 there's one. About 200 meters.

YOUNG 12 oclock and 200 meters.

CAPCOM Okay, you'll be in the neighborhood and range of 3.0 or a little bit greater.

YOUNG Okay, I'm just glad that we don't have that watch the Rover go TV. I don't think we'd be going.

DUKE Hey, Tony, look at that.

YOUNG Where is it, Charlie.

DUKE To the left there, John. See those blocks over there in the crater.

YOUNG Say, where.
DUKE Okay, you're at 10:00 position.
YOUNG That big block there?
DUKE No, well, on over farther than that.
YOUNG You want to take off and go that way now?
I can't see nothing. I got my blinder down.
DUKE Oh, I'm sorry. Okay, now hook a left.
No not through this crater.
YOUNG Okay, yeah.
DUKE Right on the other side of this crater.
YOUNG Can't expect trouble from a backseat driver.
CAPCOM Yeah, I noticed that.
DUKE Well, that's only 3.3 John. Why don't we
go down a little bit further.
YOUNG This one right here.
DUKE Yeah, that one's only 3.3 down. We think
about 3.0. It turns out it's not a crater at all any way.
It's just a swale.
DUKE Yeah, really some interesting angular
blocks here.
DUKE Hey, Tony, it still apparently, well, we
varied, we're staying about 3.0 now and we're getting some
angular blocks and cobbles just as we described before. 20
percent of the surface perhaps.
CAPCOM Okay. The nominal station 4 would be on a
bearing of 3.56. But you're going to have to use your own
judgment.
DUKE Okay, that's pretty good. We'll bear over
that one. Okay.
CAPCOM 356 at what, Charlie?
DUKE At 3.0.
DUKE 3.0 Okay?
YOUNG Like driving a camel.
DUKE Yeah. Hey, Tony, over on Smoky it doesn't
appear - I can see the lineations over there but they are more
widely spaced than on Stone here and mostly parallel to the Cayley.
Bear left a little bit, John, if you can. There's a -- Okay
we're 3. We can start looking for a place now.
YOUNG Here's a batch right down here, I think.
DUKE Yeah, I see it.
YOUNG You do?
DUKE Yeah. Now if we drive along the ridge
maybe we'll find a blocky crater.
YOUNG Bronco, right or left.
DUKE Left. Cause Station 8 is on over to the
left.
YOUNG Look at that block there, Charlie.
DUKE Where?

YOUNG That big block right there.
DUKE I know it, that's the one I described.
It's a giant size.
DUKE Hey, Tony, we're at 3.0 at 3.55 driving west along the bench trying to find a blocky crater.
CAPCOM Okay. Sounds good.
DUKE Passing these big glass spattered rocks that apparently came out of South Ray. I think everyone of them did, frankly.
DUKE Hey, here's a crater here, John, that's about 10 meters. That's fairly blocky round, angular. Want to stop here? It's a secondary on this side.
YOUNG Yeah.
YOUNG What do you think?
DUKE Tony, here's a secondary. We're at 357 at 3.1 and we got a secondary that's fairly blocky round. There's one a little up slope from us that might be better. But it's not as many blocks on the rim. Same size crater.
CAPCOM Okay, we'd like some more blocky ones.
DUKE Okay, I think it's a secondary.
CAPCOM Right (garbled)
DUKE (garbled) punched a 180 here, John.
YOUNG Yeah, I can't park 180 if I park 180 we'll be down slope from it.
DUKE No, the crater's over to the left.
YOUNG I know where the crater is.
DUKE Oh.
DUKE Why, don't you just park north. I can point that antenna north.
YOUNG Okay.
DUKE Got to get over here to the right a little bit so the TV will be looking out of the Sun.
DUKE Okay, this is good.
YOUNG Yeah.
YOUNG I'll just swing around and point it north.
How will that be? There.
DUKE That's great.
DUKE Good show.
YOUNG Okay.
DUKE Okay, Tony, 180 357 6.7 3.1 100 95 and 00 maybe 2 MCs. That's 95 and 110. Off scale low, and off scale low, and off scale low and off scale low. Over.
CAPCOM Okay, we copy that and verify DAC OFF.
DUKE As soon as I get out.
CAPCOM Okay, and we'll also need EMU vector.

END OF TAPE

DUKE Soon as I get out.
CAPCOM Okay, and we'll also need the EMU check here.
DUKE Okay, I don't have any flags, I can't see
my quantity.
YOUNG Got about 65%
DUKE 65% and my pressure's good and I'm just --
I haven't changed my cooling.
CAPCOM Okay.
PAO This is Apollo Control. Young and Duke
are scheduled to spend about 20 minutes at this station, how-
ever, they're running about 15 minutes behind, so this station
and possibly station 8 could be cut a little bit short to make
that up.
YOUNG Could we just sort of bounce it here.
DUKE Yeah, there's a lot more -- Tony, the rego-
lith character John said it's really changed.
YOUNG Okay, let me get that.
DUKE When we walk, we don't bounce as much -- I
mean we don't sink in as much.
YOUNG Put it at 2 --
YOUNG Charlie --
CAPCOM Down here we got a picture.
DUKE Now, we got a picture.
YOUNG Rog. And you hardly got any dust on you,
but I'm going to do you a favor and dust ya'll off.
CAPCOM Alright.
YOUNG What ya doing there, Charlie?
DUKE -- what this rock is made out of -- I'm
trying to get a fresh surface.
YOUNG I wouldn't do that...it's not worth doing.
YOUNG Can't help you there.
CAPCOM Ah, thank you much there, John.
YOUNG Man, that is some rock.
DUKE Yeah, matrix there pure white, John, with
black phenocryst in it.
YOUNG It might be classed -- it might be a breccia.
And it's got some (garble)-like crystals in it.
DUKE Look at that!
YOUNG That's the one I'm talking about -- see I
just broke that open.
DUKE Yeah, that's a two rock breccia.
YOUNG Let me get a bigger piece of it, Charlie.
DUKE I think -- okay, I don't know -- you can't
whack it off.
YOUNG Too hard to whack?
DUKE Yeah, I've whacked about 5 times, as hard
as I could.
YOUNG Okay, Houston, it has a white matrix

YOUNG with a square glass and a longate glass in it.

CAPCOM Okay, sounds good.

YOUNG That might be it, and it's rounded too.

CAPCOM Very good, we understand 2 rock breccia.

DUKE Looks like some more of them right down here John that are sample size.

YOUNG Okay, let's get some of those. We only got 20 minutes here.

DUKE I'll start the pan.

YOUNG Okay.

CAPCOM And John, we'll need the EMU check.

YOUNG Okay, I'm reading 385, no flags, everytime I read my oxygen gauge I get a -- (laughter) get an ear full of orange juice.

DUKE Yeah, mine too.

YOUNG 58% and I'm on between intermediate and minimum cooling.

CAPCOM Okay, we copy.

DUKE Okay, pan's complete, Tony.

CAPCOM Very good.

DUKE I could -- grab the gnomon, John -- how about a set of tongs and a shovel -- that ought to be good.

YOUNG Think that ought to work?

DUKE Yeah. -- that'll probably save us some energy.

YOUNG Yep, think we might need it.

DUKE Guess what?

YOUNG What?

DUKE Look at that.

YOUNG Where are the wheels?

DUKE That is?

YOUNG Yeah.

DUKE That's the gnomon stick. See the legs? They're still in the bag.

YOUNG Houston, you got any recommendations there?

CAPCOM Yeah, I think you ought to just use your scoop or something for a gnomon.

DUKE Did you see what happened?

CAPCOM No, we can't right see it now, but understand exactly what you mean.

YOUNG You blew it.

DUKE I got the wand, and the legs stayed in the bag. Give me the shovel, John. We can use the scoop.

YOUNG Okay, well, we can use the shovel -- where do you want to go?

DUKE I don't care. Anywhere is fine. This looks like a -- here's a nice little cracked one right there -- you want some angular -- there's some angular and rounded rocks

DUKE right there.
CAPCOM Just pick anything in the picture for scale
all we'll lose is the radical.
YOUNG Okay.
DUKE You could stick the tongs in there, John.
YOUNG Good.
DUKE It'll go in the ground. I tried that a
minute ago -- it worked great. I don't see why I'm doing a
downsun, but I'll do it. Hey, Tony, can you get a locator for
the TV on this sample?
CAPCOM I sure can -- we've got it now.
DUKE Just standby.
YOUNG Okay, thank you.
DUKE Okay.
YOUNG Excuse me.
DUKE Okay, that's going in bag 407, it was some soil,
some dirt and rounded rock.
YOUNG But wait a minute Charlie, let me get a --
after that.
DUKE Okay.
DUKE Okay.
YOUNG Let's grab this angular one next.
DUKE Alright.
YOUNG Okay?
DUKE Yep.
YOUNG Don't now -- wait -- Charlie,
DUKE Huh?
YOUNG -- let me get it with a tong.
DUKE Leaning on that shovel, it's easy. Might
be the same kind, John, you picked up up the way there.
YOUNG Okay -- hold the sack there. Maybe
you can - partially sacked -- there we go.
DUKE -- you got it!
YOUNG Okay, that -- get the after. Got it. 408
Houston, is the bag number.
DUKE Now, I'll swap ya.
YOUNG Why don't you get a soil sample.
DUKE Okay, that's a good idea.
CAPCOM Okay, and you've got about 10 minutes left
before we'll have to leave.
YOUNG Okay.
DUKE Okay, maybe we could go to one more area
and so we won't salt it with this -- since it is just one
broken up block here.
CAPCOM Good planning.
CAPCOM Hey, you fellas are always thinking.
DUKE Well, we try to please. 338 is the soil
sample.

CAPCOM Okay.
DUKE That spinning up that bag really works great. Need anything done over there, John?
YOUNG No, this is the rim of it -- it's very soft. I didn't have any trouble digging down with the shovel. Solid gray all the way down -- I see no layering.
CAPCOM Okay.
YOUNG Just put this in your bag.
DUKE John, how about on the upper rim there. This might have been a secondary.
YOUNG What's that right over there, Charlie?
DUKE It's really a unique white looking something-or-other.
YOUNG Yeah, go see what that is.
DUKE I think it is soil.
PAO This is Apollo --

END OF TAPE

DUKE I think it's soil.
PAO This is Apollo control. We appear to have excellent margins in the portable life support system and are considering extending the EVA an additional 20 minutes.
DUKE It might have been just a little - yes, it looks like a little teeny impact, doesn't it.
DUKE Let's get a quick one and then go on up here and get some of these blocks on the upper rim.
YOUNG Okay. Okay, there's f ll.
DUKE Okay.
YOUNG A down sun. Turn around and get locator.
DUKE Boy, this 1/6 gravity is so neat. Got you a bag coming, John. Hey, Tony what we're picking up is a white - it looks like a little patch of inderated regolith, and it's whiteish in color.
CAPCOM Okay, we copy.
DUKE Okay, let's get a little bit more of the white, John.
YOUNG They, got most if it, it was just on the end of the scoop.
DUKE Okay.
YOUNG Oh, that's great.
YOUNG I got it - now that's got it.
DUKE I'll get your after.
YOUNG I'll get it, Charlie.
DUKE Okay. Okay, that's in bag - that soil samples in 339, Tony.
CAPCOM Okay, 339.
YOUNG I'm to frame count 106, now.
CAPCOM Okay, 106.
YOUNG Hey, we've got a chance to get up another sample.
CAPCOM Okay, we've got about time for just one more.
YOUNG Okay.
DUKE Okay.
YOUNG I'm hankering for a piece off that rock.
DUKE Here's an old rounded one right here, John. The one with the white spots in it.
YOUNG I don't think -
DUKE Here's a real angular one over here. It's probably out of a -
YOUNG Let's get this rounded one just on a huntch.
DUKE Okay, agree.
YOUNG Down sun, here.
DUKE Got it.
YOUNG Wait a minute, okay.
DUKE Okay. We got that thing. Great show.

YOUNG In bag 409, Houston. And it's so dust covered that I'm unable to describe it. It's a white sub-rounded rock and I can't distinguish any crystalline structure in it. It's going in bag 409.

CAPCOM Okay. And you've got 5 minute, here.

YOUNG Charlie, put that in mine yours is full.

DUKE Okay, yours is getting full too, we're going to have to change out bags. Whoops. My bags are full.

YOUNG Almost.

CAPCOM You fellows really been scooping them up, there.

YOUNG Yes.

DUKE Hey, John, bring me the scoop. a minute and let me wack this thing right here. It's so cute that I can't pass it up. There's a good place to wack, nothing to lean on.

YOUNG Charlie, beautiful.

CAPCOM Demolished it.

DUKE Great rock look at this. Well so, we didn't get it documented before, Tony, but this is a good sample. It's a, I think, it's a crystal rock just a minute -

CAPCOM Okay, let's go ahead and document it, now so get the location of the one that's still in place. It didn't look like it moved.

YOUNG No, he didn't move anything there. Gonna do an upsun on this document.

DUKE Okay, I'll get a cross sun here. It's a grayish blueish rock, Tony, in the matrix with some white cast in it. Let me get it with this - it isn't any trouble, John. Man, the matrix is so fine grained that I can't tell, Tony, but it definitely got a blue cast to it and includes of a whiteish that looks like plag to me.

CAPCOM Okay, we copy that. Sounds great. We're going to have to move out.

DUKE Okay.

YOUNG And in needle light black crystals in it too.

DUKE Yes.

YOUNG I see one in there that's a millimeter wide by 3 millimeters long and some other needlelight crystals in it.

DUKE Here's another piece - came off the same rock.

YOUNG It has this white cast in it. It's got to be a breccia, Charlie.

DUKE Think so, yes, they don't really look a -

YOUNG That's going in bag 41 - 410.

CAPCOM Okay, 410.

YOUNG Okay.

DUKE Tony, when you say 5 minutes does that mean that we be on the rover moving.

CAPCOM Okay, that's that the rolling time. It's time to load up right now.

DUKE Okay. You're is hooked too, John.

YOUNG How do you get it unhooked.

DUKE I don't know. You get it.

YOUNG Your training bags never did hook.

DUKE I know it.

YOUNG That is its never unhooked.

DUKE Okay, I'll put this up.

YOUNG Okay.

DUKE You go get the TV.

YOUNG Oh, this is a neat way to travel.

DUKE Isn't it great? I like to skip along.

YOUNG Not me, boy.

CAPCOM Oh, Charlie, your pure crazy.

YOUNG Okay.

DUKE Well, whatever you call it.

YOUNG Okay.

DUKE I can't get my left leg in front of me. The doc's never knew.

CAPCOM You fooled them again.

YOUNG Okay, we're going mode switch to one.

CAPCOM Roger.

PAO This is Apollo control, we have moved the clock ahead that's keeping track of the amount of time remaining on the portable life support systems. Moved it ahead 20 minutes, of which, if we can continue on would give us a 20 minute stretch on this EVA, add 20 minutes to it giving us a total of 7 hours 20 minutes. Young and Duke will now by-pass station 7 and continue on to station 8.

YOUNG Oh, you rat.

DUKE Sorry, John, but my seat belt fell off.

YOUNG Fell off?

DUKE Well, it was on the floor.

YOUNG But Charlie (garble).

DUKE Fell down again, John.

YOUNG Yes, I saw that. Did you loose it. You want me to get out and help you.

DUKE No, I'll get it man, man and I'm next to the rover. My back pack hit the seat and boulded my off. How does my camera lens look?

YOUNG Dusty, we'll dust it at the next place.

CAPCOM And, Charlie, we'll need a frame count.

YOUNG I'm sorry it's taking - frame is 111.

CAPCOM Okay, 111.

DUKE 50 for me, Charlie.

CAPCOM Okay, 50.

YOUNG Your back - we're going to have to - you
knocked off your what-you-call-it your -

DUKE My bag.

YOUNG Wait a minute. It's not off, but it will
be in a second, it's loose. Turn around and let me see. No,
it's still velcro on.

DUKE Okay, good.

YOUNG (Garble).

DUKE That would be bad. Yes, wait a - I hate
to say it, John, but I'm going to have to take a mintue to
fix this buddies SLSS bag.

YOUNG Okay.

DUKE About, to come loose. This is grand.
Hey, Tony, we delaying the buddies SLSS bag was working loose.

CAPCOM Okay.

DUKE Okay, there it is.

END OF TAPE

YOUNG Are you doing okay, Charlie?
 DUKE Yes, I'm doing fine.
 YOUNG Okay.
 DUKE I just can't get my PLSS back in there,
 there we go.
 YOUNG All set?
 DUKE Just a minute.
 DUKE Okay, there, I'm in, finally.
 CAPCOM Are the change vectors on?
 YOUNG Affirmative.
 DUKE Yes, sir.
 CAPCOM Great.
 DUKE And we by-pass station 7 and we go to
 8.
 CAPCOM All right we figure(unintelligible).
 DUKE Okay, so that's distance, right?
 CAPCOM That's right.
 DUKE 274, okay, John I make it 6. - 7.5 on
 distance. Look at that blue rock that we just walked on!
 CAPCOM And when you get there, you'll read
 3.0 -
 YOUNG 3.0
 CAPCOM and 10 degrees.
 DUKE Okay, okay, we're going down slope,
 cross slope, Tony and I feel like I'm about to fall out
 we're still in a blocky field fact just South Ray
 material I think it's all over the place.
 YOUNG Did you know -
 YOUNG I'm glad you got a seat belt on
 Charlie.
 DUKE Me too. I can still see all the way
 around. We sure parked on - you landed on a - the highest
 ground around, John. Even down in that crater you can see -
 you can still see it.
 CAPCOM Yeah, not bad for a Navy pilot.
 YOUNG No, he did a great job.
 DUKE Okay, we back into a thicker part
 of the ray, Tony, the regolith is here covered with
 cobbles about 40 to 50 percent. Going to have to bear way
 left, John.
 DUKE Okay, now if we hold that range, like
 the tack end, look at that piece of glass, we just rolled
 over. This will be great, 015, we've got to go.
 CAPCOM We sure hope you don't get a flat tire
 there.
 DUKE We won't.
 YOUNG 015?
 DUKE Yeah. Man, if you could see these
 rocks, you'd hope it. Oh boy, we ran over that beauty.
 CAPCOM There should be a lot of boulders
 in here and we'd like you to get a lot of the Hasselblad
 photos and then when you go past the north side of Stubby
 swing you DAK around.

DUKE Okay, we're not going to be able to see Stubby, Tony, it's on the other side of a big ridge.

CAPCOM Okay.

DUKE The map was wrong. It's been mapped wrong, we're down in a little swale now and there's about a 30 meter ridge off to our left about 300 meters and it blocks out Stubby. Do you want us to go up and travel along that ridge?

CAPCOM Well, depending on your trafficability.

DUKE Well, we could do it. I'd like to see back into Stubby.

CAPCOM Well, why don't you press on up there.

DUKE Want to John?

YOUNG Yeah, might as well. We've got to by that big rock. Is that where we're going to that big rock?

DUKE That would be a great place to sample the ray. That's probably on the ray. But we - they want to go left about 10 o'clock on the top of that ridge.

YOUNG Okay, will you be able to take pictures?

DUKE Yeah.

DUKE Okay, Tony, this is really a - really a ray. In fact you can see coming out over the ridge, you can distinctly see the rays from South Ray. The whiter albedo and they contact between the white rays and the Cayley here. Quite apparent.

CAPCOM Okay, very good.

DUKE We're now at 005 at 3.0 and the contact I'm talking about is at 12 o'clock probably a couple of hundred meters.

YOUNG You know, I don't want to be discouraged about this sort of thing, but I feel like this may be a problem we're going to have to attack logistically out here. Because, boy, it is really difficult to tell just looking at a rock, except for the rounded and the, except for the rounded, it's difficult to tell what kind of a rock it is. Now there's a vesicular looking rock right there.

DUKE Yeah.

YOUNG That's the first rock I've seen with vesicles in it.

DUKE Okay, Tony, we're traveling now southwest. We're at 006 at 3.0 -

CAPCOM Okay copy -

DUKE - we've still got a couple of hundred meters to go up to the ridge. Why don't you swing directly south and go - let's just go straight up that beauty. See what we see up there, probably nothing but another ridge.

YOUNG It's pretty steep, Charlie.

DUKE We're making 610 or 6 kilometers an hour.

YOUNG That's really a steep ridge.

DUKE This is here?
YOUNG Yes.
DUKE Have you got full throttle?
YOUNG I've got full throttle. We're hardly
moving.
CAPCOM Okay, want to read some amps?
DUKE Yeah, we've got 55, 50.
YOUNG Okay, what it is is we've lost the
rear wheel drive.
CAPCOM Okay -
YOUNG - not reading any amps on the rear wheels.
CAPCOM Okay, copy that.
YOUNG With that in mind, I would just as soon
not go up to this ridge, Charlie.
DUKE Me too. Agreed.
CAPCOM Okay, we suggest you head on towards 8
and stay on fairly flat ground and we'll work up a procedure
DUKE John, why don't we check it, can you turn
the board off and see if we move? It just might be a steep
slope. But the front wheels were really digging in.
YOUNG No, Charlie, the ammeter was reading 0.
DUKE I know, could be a broken meter.
DUKE Okay, Tony at 007 3.1 passing another
secondary thats elongates in the direction of South Ray and
it. Those are the big blocks we're talking about John right
over there 4 or 5 of them.
CAPCOM And how fast are you making now John?
DUKE The regolith is still -
DUKE say again?
CAPCOM How fast are you doing?
DUKE What did you say Tony?
YOUNG He wants to know how fast we're going.
DUKE We're going at 7 clicks.
CAPCOM Okay.
DUKE How about stopping up there in the middle
of all of those big boulders, John?
YOUNG Call that station 8?
DUKE Call that station 8, that's going to be
about it. We're about

END OF TAPE

DUKE Here's one, it's overturnable, I'll bet you. Right there. Look at that elongated one that thread there -- whatever that is.

DUKE Okay, Tony, we're at 00010 at 3.0 and we've got about 3 or 4 -- 2 to 3 meter size blocks, one black and some white ones. How does this stop sound?

CAPCOM Okay, this sounds pretty good.

DUKE Okay, 180, John, on the heading. On 270 they want a NAV update.

YOUNG That's right.

CAPCOM Okay, and we're looking primarily for blocks from South Ray, so if you feel like this is the Ray, this sounds great. And we don't need an NAV update, so 180 is great.

DUKE What do you think, John?

YOUNG Oh, yeah. I definitely think just about-- this is fine here. Get on up a little bit over ---

DUKE That full throttle.

YOUNG Yep. Charlie.

DUKE Easy. Okay, Tony, 176 011 7.9 2.9 195 95 00 100 115 110 make it, and I can't see the motor -- all scale low, front and rear motors, forward motors, all scale low rear ones.

CAPCOM Okay, we copy that.

YOUNG Okay, Houston, what happened we may have been ---

DUKE Excuse me, John, I'm sorry --

YOUNG Okay, my best guess of what may have happened, Houston, is that -- is that we may have cut a wire or something on the back.

CAPCOM Cut a wire? Uh--

DUKE Okay, I --- yeah, a wire going back there to that aft thing. We hit -- on the way down here, the regolith and everything being what it is, when we were bouncing up in the air we may have come --- we came down on at least 2 rocks that I know about.

CAPCOM Okay, understand.

YOUNG Well it's a sort of dynamic situation that I don't think anybody was thinking about much.

DUKE Can you see those wire -- I can't. Okay, Tony starting our pan, from about the 1:00 position of the Rover, sort of bracketing each blocks here.

CAPCOM Okay.

YOUNG Okay, station 7.

DUKE John, before I do this how about checking my lense?

YOUNG And verify the back's (garble) off.

DUKE I missed that, stand by.

YOUNG That was mine, Charlie.
YOUNG Yours was great.
YOUNG It did good.
YOUNG Okay, go Okay, mode switch to one.
DUKE Thanks for the reminder, Tony. .
CAPCOM Okay.
YOUNG Man, those battery covers are filthy.
CAPCOM We aim to please, too.
DUKE And the regolith here, is firmer than upon
Stone. We're in a blocky field here. The predominant size is 10 to
15 centimeters, but the biggest one is a couple of meters
and you'll see that 12:00 from the Rober. Bluish cast to it
black, maybe.
YOUNG Okay, you already see it, huh?
DUKE And beyond that there's a white one it --
it looks like a big -- big one that, John, sampled. We ought
to get one of those. Okay, pans complete. Double core here is
first thing. And I'll sample -- I think we're in the Ray, so
I'll just do it right over here.
YOUNG Okay, Houston, you should have us now.
CAPCOM Okay, we sure do.
YOUNG What are you doing, Charlie?
YOUNG Charlie?
DUKE What?
YOUNG What are you doing?
DUKE Stand by. Tell you later.
YOUNG Okay, I need to get a double cord to.
DUKE Okay.
CAPCOM Thank you, John.
DUKE Agh, God dang.
PAO This site is the primary site for sampling
Ray material thrown out of South Ray crater.
DUKE Okay, there we go.
YOUNG There's an upper and lower.
DUKE Closed again.
YOUNG Okay.
DUKE What did he say -- dinn't he call you for
something, John?
YOUNG What did you say, Tony? Oh, he said thank
you.
DUKE How do you read, Houston?
CAPCOM Oh, you sound good, Charlie.
DUKE Okay, thank you.
YOUNG Ah, there's a boulder over here will it
fit?
DUKE Yeah.
YOUNG You see it?

DUKE That's one -- that one off to your right down there, I think we can turn that one over.

YOUNG Yeah, I think you're right. I think we can turn that one over, Charlie.

DUKE How about samples of those 2 -- that white one and that big one on the other side over there.

YOUNG Get a chance. Can I help you with the double core.

DUKE No go ahead with what you got to do. You know I can get a rake soil here while you're doing that. Okay?

YOUNG Okay, fine I'll just have to take the scoop off. Can you do that rake soil by yourself, you think.

DUKE Yeah.

YOUNG Okay.

DUKE I can do it. Okay, rake soil away from the boulders.

CAPCOM I'm just a little curious, how near are you to the edge of this Ray?

DUKE Goes in both directions as far as we can see.

YOUNG That's right.

CAPCOM Okay. We can forget that one sample off there.

DUKE Tony, the whole area --- Tony, the whole area is just covered with these rocks.

CAPCOM Yeah, it sure looks that way.

DUKE Have you seen the rocks on the -- okay that's what they all are.

CAPCOM Okay, I guess we're just looking for a variety then in the boulder protocol.

END OF TAPE

CAPCOM Okay, I guess we're just looking for variety then in the boulder protocol.

DUKE Okay, we can give you that, I'll tell you. There's 2 big boulders at 12 o'clock that are going to be great sampling. One of them is rounded, and but the biggest, and the other one is a white--black, the other is white and it's sharp -- very angular.

CAPCOM Okay.

DUKE Okay, I pushed the core in double core Tony, about -- almost up to the second -- it's about half way up to first.

YOUNG Charlie, I get a locator on you and the down-sun too.

DUKE Okay, great.

YOUNG Seven feet.

YOUNG Six.

YOUNG There Charlie.

DUKE Okay, it's not going in too well.

YOUNG It's pretty hard around here.

DUKE Ah, rats!

CAPCOM That's all right -- I do that all the time. Usually I have my thumb in the way.

DUKE Oh boy.

DUKE I can't do it -- can't get down that far.

DUKE Now I'm going to have to get the tongs.

CAPCOM Eh, it looks like a good plan.

YOUNG -- the hammer.

DUKE Tony, I don't think -- yeah, Tony, I don't think the double core is going to. You want me pull it out, shake it out and try another place? I think I hit a rock.

CAPCOM Okay, yeah, we would sure like for you to do that.

DUKE (garble) all at once. Okay. That one just stopped all at once, so I think I did hit a rock.

CAPCOM Okay.

YOUNG Okay, Houston --

CAPCOM And John, on the LRV, do you know if you lock the rear steering as well as the drive?

YOUNG No, because I'm unable to see behind me.

CAPCOM Okay.

DUKE Give it a little test drive, John.

YOUNG Yeah. I wasn't getting any -- I wasn't getting hardly any amps out of the rear, I was getting some, so maybe that's an indication that I had rear steering.

CAPCOM Okay. Except a while ago we had a (garble)

YOUNG Oh, have a -- I have 5 -- Duke, I've got about a 10 rock frags, a couple of which are -- one of which is mentioning black glass along the sides of it, the other which is coated with black glass, and , but in the most

YOUNG -- there's not much of that material around here. That's going into bag 411.
CAPCOM Okay, bag 411.
YOUNG We're far away from boulders. There's hardly anything but soil -- very few rocks in other words.
CAPCOM Understand.
DUKE Agh! Oh, you dog! Phew! Take a break!
CAPCOM Good idea.
YOUNG Yeah, Charlie, slow down.
DUKE Phew! Man, there's little glass beads just all over the place here, John. A little -- places where little white rocks seem to have hit.
YOUNG Good, I'll get a soil sample here.
DUKE Phew! Boy, it is hard over here, Tony!
CAPCOM Right, it sure looks it, but I see you're getting it down.
DUKE Phew! It's in!
CAPCOM Good job.
DUKE Little off of vertical, but you're just going to have to take it.
CAPCOM Oh, I think we'll take it, Charlie.
DUKE Okay.
DUKE Boy, I hope that thing's full of gold, 'cause that was a hard one! PHEW!! I can't believe it comes out so easy. Hey, the bottom one is 36, Tony..
CAPCOM Okay.
DUKE I've got my hand over the top number, I'll give it to you in a minute.
CAPCOM Okay.
YOUNG Okay, the soil sample here Houston, is going in bag 412.
CAPCOM Okay 412.
YOUNG I don't know what this is staring up here at me, Houston, but I'm going to pick it up because --
CAPCOM Anything that stares at ya, ya better pick it up.
YOUNG -- it's a glass, but in that sunlight it's reflecting red, green, like a rainbow.
DUKE Found the first prism on the Moon, John?
YOUNG or something like that! Phew! Boy!
YOUNG Charlie, guess who's out of bags?
DUKE H-O-L-D the command there! Wait a minute, I'll come get you one.
YOUNG I don't know if that thing will last or not. Naw, I guess it was just black glass, but it was the way the Sun was reflecting off of it, -- that's too bad. Anyway that sample is going in bag 413.
CAPCOM Okay 413.
DUKE Okay, Tony, the bottom core as I said was

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DUKE -- 36, and the top part is 20 -- man, I
think -- wait a minute!

END OF TAPE

YOUNG ... 413.
 CAPCOM Okay 413.
 DUKE Okay, Tony, the bottom - the bottom core
 as I said was 36 and the top part is 20 - 29 I think wait a
 minute - 29.
 CAPCOM Okay, we copy 29.
 YOUNG I didn't know you guys. were watching
 I wouldn't have done that (laughter).
 DUKE I've found a use for every geology tool
 we've got back here.
 YOUNG Let's drive over there, Charlie, let me
 check out this -
 DUKE That's a good idea, John.
 DUKE Houston, turn off the front drive power,
 too, and -
 YOUNG I think your right because the front
 wheels were really digging in.
 CAPCOM Okay.
 YOUNG Alright, if we just leave the TV on and
 just drive over where we're going to sample these boulders,
 and test this thing out a little. Will that mess you up to
 bad? Or do you loose sink or something and never get it back.
 I know there are some core tube caps in here somewhere,
 but can't find them.
 YOUNG We're just going to drive slow because
 we want to check this baby out.
 DUKE Need some more bags, John.
 YOUNG Yes.
 DUKE Okay, here's the set up on your seat.
 YOUNG There's a core tube cap.
 DUKE Does not answer it.
 YOUNG Houston, how do you read, over.
 CAPCOM We're copying you 5 by. We understand
 that your going to drive over to the other area.
 DUKE We'd like to and we'd like to run through
 a rover steering test while we're doing it. What we talked
 about doing - you see those boulders your looking at we was
 talking about driving around this crater about halfway around
 it to do the steering test.
 CAPCOM Okay, sounds good and we would like - after
 you've done that we would like to go through a procedure of
 our own while your on there.
 YOUNG Alrighty, you want to stay off and watch,
 Charlie.
 DUKE Yeah, I'm going to watch. Okay, Tony did
 you get the double core? The top one was 29.
 CAPCOM Yes, we copied that.
 DUKE Okay.
 YOUNG Oh boy.

DUKE I'll get it, John. Go ahead and get in,
I'm (garble).
YOUNG No, we've got it.
DUKE How about that one?
YOUNG They wouldn't believe it if we ran only get it
out of there.
DUKE (Laughter) I wouldn't believe it if I saw
it again. Here you go.
YOUNG Okay. That lower box finally came out
of there.
DUKE Okay, your all locked.
YOUNG Okay.
DUKE Man, there's a lot of glass around here.
YOUNG Okay, now what I'm going to do is -
DUKE Why don't you try -
YOUNG Excuse me - I'm going to turn, I'm going
to try the steering first, Charlie.
DUKE Okay, why don't you just go to P primary
and let me check at look at her.
YOUNG Okay, primary.
DUKE It's working.
YOUNG Steerings working?
DUKE Yeah. Okay, why don't you just try rear
drive only.
CAPCOM Okay, how are your amps?
YOUNG Just sitting here doing nothing.
CAPCOM Okay.
YOUNG Now a - D max, Charlie.
DUKE It ain't going, you lost it.
YOUNG Now let's take the - put them on BUS C
antenna.
DUKE Okay.
CAPCOM Okay, how about the rear drive on the
BUS A and B.
YOUNG Okay, we've got it.
DUKE That's okay, you got it.
YOUNG We got it right? Okay, Houston we got
rear steering on BUS - wait a minute, wait a minute, wait a
minute. Was that four drive power - no just with the four
drive power. Okay, now I'll put the left rear on BUS B. Now
let's see what we've got.
DUKE Nope, John, nothing.
YOUNG Okay, we've tried the forward and rear
steering on BUS B. We have rear steering, we have forward
steering. We have forward drive power, but we don't have any
rear drive power on either BUS. Let me try it in secondary.
CAPCOM Okay, John, we'd like you to try the
PWM 1 on the left rear and right rear.
YOUNG You want me to go - okay you want. I'm

YOUNG in PWM 1 in left rear and right rear.
CAPCOM Roger.
YOUNG You want me to go to PWM 2 on the front rear?
CAPCOM Negative, we would like all the drive enable to PWM 1.
YOUNG Okay, their all in PWM 1. Do they have to be in PWM 1 select 1 or both.
CAPCOM Negative.
YOUNG Oh, that's the problem.
DUKE That's the problem you weren't in both.
YOUNG That is the problem. Some how this guarded switch got moved to - isn't that amazing.
DUKE Amazing, unbelievable.
CAPCOM Okay, your ready -
DUKE Your still in one -
YOUNG Okay, I'm going to turn off the front drive power.
DUKE Okay, your in one. There you go. That's it.
YOUNG Okay, now, let's see if we got it.
CAPCOM Okay, we'd like to go back to nominal configuration.
DUKE Your got your (garble) powers off, John.
YOUNG That's what we're doing. And that's right your rear steer - rear motor.
DUKE Okay, you've got it now.
YOUNG That's all it was Houston. PWM 1 was PWM select was in 1. That was the problem. Sorry about all that inconvenience.
YOUNG Try that I've haven't done that since we been up here. Watch out Charlie, I'm going to run over you.
DUKE (Garble).
YOUNG (Garble).
CAPCOM John, after you went back to normal configuration did you drive it?
YOUNG Yes, did it mess you up?
DUKE Houston.
YOUNG Nope (garble).
YOUNG You still got a picture, huh?
CAPCOM Sure do. But I think we need the antenna touched up.
YOUNG (Garble) I could do it if I drove slow. Oh aren't you glad too.
DUKE Tony, this is really some rock. It's a two rock breccia it's a matrix being to me in this light, anyway and the white clast are a crystalline fragments of crystalline rock that appear to be fairly course grained - take that back fine, let's say fine grained ...

END OF TAPE

DUKE Crystalline fragments of crystal and rocks that appear to be fairly coarse grained. Take that back. I'm going to say fine grained.

YOUNG That's the one you want to turn over, Charlie.

DUKE This thing. Gosh! I can't budge it.

YOUNG It's a (garbled)

DUKE Hey, I did budge it.

YOUNG Charlie, want's to turn that one over, Houston.

DUKE I want to get a chip out of it. Look at that rock over there, John. If that's not a crystalline rock, I'll --

YOUNG Eat the whole thing.

DUKE Be a pleasure. Right here. The whole thing.

CAPCOM I wouldn't bet on that, Charlie, (garbled)

DUKE Yeah, but I didn't get a close a closer.

DUKE I don't think we can turn that one over.

YOUNG (laughs)

DUKE I can move it. I can rock it.

YOUNG Wait a minute. Wait a minute. Let's go over here and look. Let's not put no effort into it. I believe we can. I believe we can push it this way.

DUKE Well, let's get a chuck off of it before we push it.

YOUNG Okay. No, I don't think so either.

DUKE There's a better one to turn over right down there it's about half its size.

YOUNG It will work good.

DUKE Yeah.

PAO The object here is to get something from underneath, a very big rock.

YOUNG Got a few footprints it for scale now, Houston.

YOUNG Yeah, get your hammer, Charlie.

DUKE Yeah, I got the hammer and I'm bringing the tongs and the scoop for a little fillet sample around it. That's a good head. Okay, Tony, we might think of a padded bag sample here, those - there's one on here that I'm convinced - well this whole rock here - this big one's a breccia - but this other one looks like a crystalline rock.

YOUNG Let me carry one of these. Let me get a little closer up to this thing. There.

CAPCOM Okay, why don't you try to chip out some of that frags there and we won't worry about overturning this one, but maybe you can get a fillet here. You haven't messed up the fillet, laying it in there too close.

DUKE Okay.

YOUNG Charlie, you got your hammer locked in your pocket.

DUKE So nobody can steal it from me.
YOUNG Best you give it to me then.
DUKE How's that?
YOUNG (garbled) ain't you.
DUKE Okay, John, let's find a good place--.
YOUNG Let's get the fillet first though.
DUKE Okay.
YOUNG Get dirt all over it.
YOUNG Actually, I don't see any fillet per se.
You just it just hit and made a - stick it in the dirt. Ended
up in the dirt, Charlie. Can't tell which way is up. How about
right there.
DUKE Okay. Fine.
YOUNG Lost some stereo where you
garbled)
DUKE Okay, just take a picture of it and I'll
hold the scoop end (garbled) standing.
YOUNG You're standing in te shadow Charlie.
YOUNG Get it after Charlie.
DUKE Huh?
YOUNG Get it in the after.
DUKE O--kay.
YOUNG Get that cotton pickin stuff out of the way.
(laughter)
YOUNG Okay, now take a big hunk out of there.
DUKE Okay, here we go. And you can't see any-
thing with that in the shadow like that.
YOUNG That's neat, huh?
DUKE Here we go.
DUKE Hey, John, here's a little piece just sitting
up here on top of the rock. That's got the --. Hey, Houston,
that sample's in bag 374.4
CAPCOM Okay. Bag 374.
YOUNG Bag. Open.
DUKE Let's see. We got a find a place to chip
that.
YOUNG Here's a place that's hanging out, Charlie.
Charlie.
DUKE Okay, let's get a --. Let me get a number
4. Why don't you put your hammer down there. Put your hammer4down
YOUNG They've got enough documentation on this
scale.
DUKE Okay. That looks great. Not to hit it, it
looks like.
YOUNG Yeah, but it's right at a fracture there.
It won't come off with a chip.
DUKE Yeah.

YOUNG And the whole rock is coming apart.
DUKE Super job, John.
CAPCOM Good show.
YOUNG Did it.
YOUNG Wow! Boy! That was a - one of those fractures that's all included with glass.
CAPCOM That right. Yes.
YOUNG Glass fractures that.
DUKE Huh?
YOUNG I think the after on this will be pretty interesting.
DUKE Okay, Tony, that's
YOUNG Don't stick that in the bag.
DUKE Yeah. Going in 340.
CAPCOM Okay, bag 340.
DUKE No, that was - yeah, bag 340 for the rock.
YOUNG Look, Charlie.
YOUNG There we go.
YOUNG How the cameras keep running in that dirt, I'll never know.
YOUNG Ah, plop.
DUKE Okay.
YOUNG Got it.
YOUNG Now how about that rock over yonder.
DUKE That's the one I'm going for. Did you get the after?
YOUNG No, I sure didn't, but I'm --
DUKE I'm not having any trouble putting this back in place, Houston.
DUKE Look at that beauty, John. That is a crystalline rock, no breccia.
CAPCOM Absolutely great.
YOUNG And no breccia, crystalline rock, huh?
DUKE And It is whitish to grey, with a lot of 2 ap plts in it.
YOUNG There is huh? A baby or a cross one? It has even have the va--could even have what looked to be (garbled) Those are 2 ap pits aren't they?
DUKE Yeah.
DUKE In fact Tony, the whole area - there's a lot of this rock - there's a lot of this rock here scattered all over - scattered around.
CAPCOM Okay, understand.
CAPCOM Good. We'll need a picture and then see if you can turn it over.
YOUNG We can't turn that one over.
CAPCOM Okay.
DUKE Maybe we can turn that over.
YOUNG Sure we might.

YOUNG If we grab hold of this corner.
 DUKE I'd like you to get a big sample first,
 though. Get the downsun.
 YOUNG Where do you want a sample from?
 DUKE Do you have a sharp corner? Right up at the
 top there?
 YOUNG Off the top?
 DUKE Yeah.
 YOUNG Okay. I don't think I can get that. It's
 fractured right there.
 DUKE Okay, I was thinking --
 YOUNG Okay, that's good. Ah shoot, look at that.
 YOUNG Well, if that ain't pure plag I never see
 it.
 DUKE Doesn't it look like pure plag?
 YOUNG I don't know what it is though.
 DUKE It's pure feldspar looks like.
 YOUNG It's pure feldspar. Ah --
 DUKE Don't it look like it's been - it's so sandy
 looking. I comes in reworked or something.
 YOUNG Maybe partially shot.
 DUKE Shot, yeah.
 DUKE But, it's pure plag, it's plag, Tony.
 CAPCOM Okay, we copy that.
 DUKE And it's in 341. Whack off another piece
 right here, John.
 CAPCOM Okay, understand it's pretty fragile.
 DUKE This rock is pretty predominate.
 YOUNG Where, Charlie.
 DUKE Now he is fucoid.
 DUKE It just fractured.
 CAPCOM Okay.
 YOUNG Where do you want to hit it off, Charlie?
 DUKE Right at that sharp see where the no--
 right there.
 YOUNG Yeah.
 DUKE See how that comes off.
 DUKE Pretty fucoid, isn't it?
 YOUNG Bad shocked.
 DUKE Yeah.
 YOUNG Put that in the same bag?
 DUKE Yeah, let's put 'em all --
 YOUNG There's another piece down there, if you -
 DUKE I'll get the tongs.
 YOUNG We gotta get the after.
 DUKE Okay, I'll get the after of that right here.

END OF TAPE

YOUNG Get the after.
DUKE Okay I'll get the after of that right here.
DUKE Okay, the first two pieces, the first
piece was off the top of the rock, the second piece is
under the shadow of the (garble) shovel and they're both
going in bag number whatever Charlie says.
DUKE 341.
CAPCOM Okay, we -
YOUNG I have another piece that came out of
the same the second flack.
CAPCOM Okay.
DUKE John, let's put this other piece in
another bag because this one has got no dust in it at all.
YOUNG Just hold that gnomon, let me clean this
one up.
CAPCOM And we'd like you to -
DUKE Let's do it without getting any -
YOUNG Okay garble, well we can try.
YOUNG Want to try rolling it down that whole.
DUKE Okay.
YOUNG Greenish hue to it too, I'm making that
up maybe.
DUKE Okay, another piece of that rock's going
in 342, Tony, and that rocks pretty - I see at least 10 other
rocks around here that have that same appearance, so it's not
a completely anomalous rock. The bag's getting full, John.
YOUNG Yeah.
DUKE I don't think we can turn that one over
but I think we can turn that one over down over there.
YOUNG Which way do you want to turn it?
DUKE I was going to push it that way, I think
you're right because we can get down below -
YOUNG Wait, let's move the toolage.
DUKE Okay.
YOUNG Here's a rock with glass splattered
all over it's body.
DUKE Let's see.
YOUNG Let me do that Charlie.
DUKE We can both lift it.
YOUNG No way.
CAPCOM Okay, forget it, John.
DUKE (garble) but I don't think we gonna do it.
DUKE Tony, there's one off at the 3 o'clock
position of the Rover that I think we can turn over.
CAPCOM Okay, have at it, and remember we're
looking for shaded samples and east/west cracks and all of
that kind of thing.
DUKE Yeah, well, there's nothing like that here.
CAPCOM Okay.
DUKE Unfortunately.
CAPCOM If you see one with a better developed

CAPCOM fillet, I'm not sure we got a good fillet on this last one so we might be willing to sample another.

DUKE Okay. Part of that job we'll looking up Sun, Tony but - oh man, John that's a biggie.

DUKE Looks bigger than I thought. Dig?

YOUNG Yeah. Now, we'll take documentation first right?

DUKE Down deeper.

YOUNG Yeah, let me take the cross Sun I (garble) okay, then we'll see if we can move it. I don't think, we can it has a pretty big base to it. Okay, 7 foot - that's 8 -

DUKE I got it. Hey look - it's got a good fillet around it.

YOUNG It does? Okay, let me turn it over and see what is - it doesn't have any dust on the top of it I thought we could get the fillet sample here but it doesn't have any dust on the top.

CAPCOM Well, we don't need dust from the top if this is a better source than the other, you might take a soil sample there and a reference soil away and then a chip off the rock and we'll have a good fillet sample.

DUKE Okay, this is a better - is a better fillet than the other one. Yeah but I thought you didn't you want you don't want breccia?

YOUNG The breccia, is this crystalline or tough breccia for fillet sample?

DUKE I don't know whether it tough or not, it's kind of hard.

YOUNG Yeah, not tough huh?

DUKE Yeah, hard (garble) John, okay?

YOUNG All righty, we'll fillet that square. Okay fillet coming in from that side, there's a good one right over here. I've already got the cross Sun. My personal guess is that this fillet didn't come off that rock.

DUKE Mine too. 375.

CAPCOM Okay, 375.

YOUNG Hold it Charlie, wait a minute, wait a minute, let me put this in your bag and give you a hand - turn that - got to get a rock off the top before we turn it right?

DUKE No, we don't have to do that. They want a chip off of it though.

YOUNG By me.

DUKE Yeah.

YOUNG (garble) busted the tip.

DUKE Okay. Hey Tony I've got a footprint in but I'll put the spade the shovel the scoop rather will be right west of where the fillet was taken.

CAPCOM Okay, good show. And we'll need a

CAPCOM reference soil.
DUKE Yeah we'll get it.
YOUNG Lift up Charlie.
DUKE That's a hard breccia, ain't it?
YOUNG A hard, hard rock.
DUKE Hit it right here on this corner right
here in your shadow now, down a little bit.
DUKE Hey, Joe, super.
CAPCOM Hey, Charlie, you just dropped a sample.
YOUNG Just opened up a -
YOUNG Charlie you're bouncing around too much.
DUKE Thank you.
YOUNG Top came loose, thank you, Houston.
DUKE Pretty good resolution, Tony.
CAPCOM Right.
DUKE Could you stick that back in my bag, John.
What do you want? John?
YOUNG No, I just feel like my suit is pressurizing
more.
DUKE What are you guys looking at down there on the
ground.
CAPCOM I was seeing it bending over a big boulder.
YOUNG (garble)
YOUNG No, my suit pressure.
CAPCOM 3.9.
YOUNG Let me get it Charlie.
DUKE I felt the same way a minute ago, John.
YOUNG I think that thing's going to be too
big to put in there anyway. Yep. (garble).
DUKE I got you. Get it?
YOUNG Yeah.
DUKE Want to crack it in two or bring the
whole - it's not going to be any good unless we can get
it in the sack.
YOUNG It ain't gonna be any good unless we
put it in the sack?
DUKE I don't think they'll ever recognize
it again.
YOUNG Yeah, throw it in my bag.
DUKE Okay. Okay, Tony that fillet, that
chip off that block.
YOUNG Okay, we've opened up a clear fillet
and there's a lot of - this is a vesicular type of breccia.
DUKE Another piece fell off here.
YOUNG Don't worry about it Charlie.
DUKE Might as well as put it in a sack so
we'll make sure with all our hammering, I don't want them
to lose it.
YOUNG Hey, let's push it over, don't think
we can. Okay, that came off the rock right there.
DUKE Okay, Tony a loose piece off the side
of the rock is going in bag 343.

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CAPCOM Okay, 343.
YOUNG Maybe we still have to push that rock.
CAPCOM Okay, and you've got -
DUKE Down slope with it John.
CAPCOM - 15 minutes left.
DUKE Yeah, we know it.

END OF TAPE

YOUNG Keep leaning on it.
DUKE That's too much work, John.
CAPCOM Don't strain yourselves there.
DUKE We can rock it out of there.
YOUNG Yeah you are don't worry. I need. Getting
the full sack too babe. Let's wait here for a second, Charlie.
DUKE Wait a minute, let me get this top closed.
Turn around just a minute to your right, thank you. Okay,
go ahead. Think you can do it, John.
YOUNG But, I was trying.
DUKE You were trying to pick it up, that's
what I tried - I tried to manage too. I can't even budge it.
YOUNG You just can't get a grip.
DUKE No, you can't not with these gloves.
Here's your hammer back. We've got to go all five meters and
get a reference soil.
CAPCOM Okay, why don't we get that reference soil
and look around for a little bit smaller boulder to turn over.
DUKE Okay.
YOUNG I think the reference soil is back there
at the soil sample.
DUKE Okay, here's 5 - 5, here's a pretty
pristine area right over here, John we haven't been walking.
YOUNG Just go over here and get it. Take the
shovel down there and I'll -
DUKE Is that five meters?
YOUNG Yeah, that's about 5 meters. 15 feet maybe.
DUKE Do I get the down sun.
YOUNG Okay, the shovel will be in the rock.
Near these rocks when we had the shovel to pick it up with so.
DUKE Man, that shovel was the locator too, Tony.
CAPCOM Okay, that sounds fine.
DUKE What is it, babe.
YOUNG I was looking for a boulder to turn over,
and I don't see any.
DUKE There's a little one right up there, it's
about a foot and a half.
YOUNG That one right there?
DUKE Yeah, uh hu. Okay, Tony is one scoopfull
enough?
CAPCOM Rog, one scoopfull.
YOUNG Had a little glass bead in it, Charlie.
DUKE Sure does.
YOUNG That's good.
DUKE Went right in. Okay, that one shovelfull,
Tony baby is in 344.
CAPCOM Okay, 344.
DUKE Put it in my bag, John, yours is full.
YOUNG (Garble).

CAPCOM We'd like you to use the rest of the time here just as document of sampling, if you don't see a more appropriate boulder than that foot and a half one.

DUKE Okay.

CAPCOM And, we encourage you to just look for some variety.

DUKE There's one down here, but that's quite a ways down to your left there is one down there but it's pretty far down slope.

YOUNG This one right here, we can turn it over, Charlie. It just isn't very big, that's all.

DUKE That's right that's what they just said they don't want that one. Whoops here we go again. Give me a hand.

YOUNG Here you go.

DUKE Okay, just push - start pushing on ahead.

YOUNG Give me your hand.

DUKE Okay. Here we go. There goes a bag.

YOUNG There goes another bag - two bags. I think we ought to trade those bags and samples.

DUKE Yeah, I'm going to empty them in the seat.

YOUNG Huh?

CAPCOM Alright, those babies look about full.

YOUNG Yeah, I think we should do that. They ain't look - they're not looking it, they really are full. We ought to go trade them out right now.

DUKE Okay.

YOUNG Both sets. Put them over hard work here. Let's go trade them, Charlie.

DUKE Yeah, that's a good idea. How are the consumables looking, Tony?

CAPCOM A we'll get a number for you.

CAPCOM Okay, your consumables look pretty good, in fact, you may even be able to get a little extension.

YOUNG Hotdiggity.

DUKE Super.

YOUNG Okay, let's see. Stand that up we're going to be using that.

CAPCOM And, Charlie, as long as your back at the rover -

YOUNG Okay, Charlie get your bag.

CAPCOM We'd like you to take some 500 millimeters when you get a chance of Stone Mountain.

DUKE Alrighty, I'll do it.

YOUNG Man, we were just up there (laughter) you weren't paying attention, huh?

DUKE And, Tony, when I shade my eyes I can still see those lineations climbing right up to the southwest, and starting at the Cayley and going right on up across the

DUKE mountain. Let's change these bags.
YOUNG Change bags. Bend over, Charlie.
DUKE Okay.
YOUNG The belts were held - I'm really surprised.
Okay, I've got it.
DUKE Okay, excuse me.
YOUNG Sorry.
DUKE Now, get yours. We got a couple of core
tubes. I'll tell you what I'll do, John - let me get yours
off of here and -
YOUNG Why don't you get the core tubes out?
DUKE Okay, I will. There's another bag under
my seat that I could put them in.
YOUNG Will they hold anymore when we do that?
DUKE No, your right. Make sure these tops are
down good, here.
YOUNG Leave it. That thing.
DUKE That one wasn't on. Mine wasn't on.
YOUNG (Garble) thing. Charlie.
DUKE What.
YOUNG I think we ought to put them under our
seats. Well, let's open the gate here. There ain't room
under our seat.
DUKE Right.
YOUNG You tell me why that thing - alright leave
them here.
YOUNG Push down on that door.

END OF TAPE

YOUNG Push down on that door. That's good.
 Balked on the thing it goes on.. (garble)
 DUKE Do you want me to open the door.
 YOUNG No, I've got it now. There we go.
 Without that camera, it's a piece of cake.
 DUKE Yeah it's -
 YOUNG Okay, now that top is closed good and
 tight.
 DUKE That one did it. Okay.
 YOUNG Now.
 DUKE Hey, Tony, we're breaking out bag 4.
 CAPCOM Okay, bag 4.
 DUKE John, I think we can just leave your
 those - doohickies - core tubes in the - in there and
 then when I get to the next place I can -
 YOUNG Use them like we normally do.
 DUKE Yeah, I'll just use them (garble).
 YOUNG All you have to do pull it free, Charlie
 you're all hung up.
 DUKE Do what?
 YOUNG Pull it in degrees.
 DUKE That's what I tried to do, but it didn't
 work.
 YOUNG Okay, it's on the top, get this velco
 strap through it.
 DUKE 5 minutes to change bags. Very expensive.
 YOUNG Charlie, since I don't have to carry
 the gnomon any more, I could carry a sample bag in one
 hand, we could use that technique.
 DUKE Thtt's yours now, it's off.
 YOUNG Okay.
 DUKE Okay, Now there's one under my feet that's
 partially full of rocks we could just use it.
 YOUNG That thing is full, that's why, and there is
 another rock under there that hasn't gone in.
 DUKE Okay, we'll get a - okay, we'll just
 break out a new one then.
 YOUNG Yeah, I think you'd better.
 DUKE Okay, I'm breaking out bag number 6.
 CAPCOM Okay, that's EB 6.
 YOUNG Oh Charlie.
 DUKE Hey, how much time we got left, Tony,
 it's taking long time.
 YOUNG Hey Charlie, can you turn to the
 right a little and bend over.
 YOUNG Garbled.
 CAPCOM Go ahead Charlie.
 DUKE Go ahead.
 CAPCOM We're prepared to let you move on
 out as soon as you're reconfigured there.
 DUKE Okay, I was just going to say -
 there's some good crystalline, that white crystalline

DUKE rock that we picked up there - there
some good fist size ones that would make good padded bag
samples.
CAPCOM Okay, while you're configuring we'll
work that.
DUKE Oh dear.
YOUNG Polish kittens with mittens could do
better than this.
DUKE Isn't it terrible? Isn't is terrible.
CAPCOM Okay, Charlie, what (garble) did you have
on before?
DUKE I think it was number 2, stand by.
CAPCOM Okay.
YOUNG There goes the fender. Uh oh .
DUKE Okay, it was number 2.
CAPCOM Okay copy that.
YOUNG No, that was mine. Charlie had number 1.
CAPCOM All right we copy that.
YOUNG And I had number 2.
DUKE Okay, Tony, we're going to start sampling
again.
CAPCOM Negative, it's time to go.
DUKE It's time to go.
CAPCOM Yes sir, it sure is.
DUKE That was terrible, taking that much time.
CAPCOM We'll get the padded bags later.
DUKE You mean I did an hour, been out here an
hour? Tony, we've been here an hour?
CAPCOM Yes, you have.
YOUNG It doesn't seem like it.
DUKE Time flies huh?
YOUNG Sure does.
DUKE The old stop nine. Close says me. Ah,
it did. We lost a fender, Tony the pusher downer fender
on the right rear wheel is gone.
CAPCOM Rog, just like the trainer.
DUKE Just exactly.
DUKE Okay, 8, 10 that's the sampling, rake
soil was done okay, only one bonus sample sorry we could
not turn one over, Tony. Okay how was frame count 120, Tony?
CAPCOM Okay, we copy that Charlie, and we may
get a boulder yet, never know.
DUKE Okay, we've still got a half mag of 3/4
of a mag on the magazine R, do want me to turn it on?
CAPCOM Yeah, let's go ahead and turn it on.
DUKE Okay, we'll let her run, one frame a second.
CAPCOM Okay.
DUKE The speed.
YOUNG Okay, Houston, we're going right straight
to 1.
CAPCOM Okay, see you later.

DUKE Rog, my frame count is 142.
CAPCOM Okay, 142.
PAO This is Apollo Control. The drive to station 9 should require about 3 minutes and Young and Duke are scheduled to spend about 25 minutes at this station.
YOUNG Looks like you're in pretty good, Charlie.
DUKE Thank you.
PAO During the stop at station 8, you heard Young and Duke talking with Tony England with some trouble-shooting procedures for the lunar roving vehicle. They had lost the rear drive, they appear to be able to fix the problem by changing a switch position, however, in the series of checks that we ran, with the Rover operating in different configurations, it didn't operate as expected in all different positions so there is something that we don't understand about it but it's it is functioning with front and rear drive and with steering on both front and rear.
DUKE I did but I didn't see that - I couldn't tell - you can't see this that west side - east side of it to see whether the thing is really filled in from the floor or not or whether is just (garble). That's where I really wanted to find out.
CAPCOM Okay, and we have a configuration change for your LRV.
DUKE Okay, go ahead with your config change.
CAPCOM Okay, on the PWM select we'd like you to go to 1. And on the drive enable -
DUKE Okay, we're on one.
CAPCOM Right the drive enables we'd like left rear and right rear to PWM 1.
DUKE Left rear and right rear to PWM 1, go.
CAPCOM And on Bat 2, BUS C circuit breaker, we'd like to pull that one, that'll load up battery 1 a little bit more, bat 2 I guess is a little hot.
DUKE You want to pull bat 2 BUS C circuit breaker?
CAPCOM That's affirmative.
YOUNG Yeah, okay bat 2 BUS C breaker coming open.

END OF TAPE

DUKE (garble) circuit breaker?
CAPCOM That's affirmative.
YOUNG Yeah. Okay, bat two buss B breaker
coming open.
DUKE (garble) is that -- is that it? Did that
complete it, Tony?
CAPCOM That's it.
DUKE Wait a minute, your drive power left rear
and right rear is in bat bus C -- the angle -- it ain't in
drive power.
CAPCOM That drive power should be normal.
YOUNG (garble) I don't understand. Yeah, that'll
be alright. Okay, fine, I don't know that much about it.
Okay, Houston, we're proceeding to station 9.
CAPCOM Okay.
DUKE Okay, John.
YOUNG Station 9. Vacant lot.
DUKE Ah, we get to sneak up on one.
CAPCOM Right. The idea is that we're looking for
an area as flat as possible with as little evidence of South
Ray material -- probably the words from the back room, you're
looking for a shallow saucer.
YOUNG (laughter) They got the -- they got the
message alright. Yeah, that's going to be a real good find
Houston.
YOUNG I don't think we can do it.
DUKE Okay, ten clicks, Tony.
CAPCOM Okay.
DUKE -- still in a cobbly area with boulders
up to a meter. Looks just like our last stop. This is a
shallow saucer area, but there's no boulders to sneak up on.
CAPCOM And could we have an amp reading with that
ten clicks?
YOUNG Right, we're doing -- what does it look
like (garble) Charlie.
DUKE 10, in that first one 20 you had 10 - -
YOUNG It's a little rash to take a pair like that
would be reading 10, Houston, but nobody can do that.
CAPCOM Okay.
DUKE I can still see the ascent stage of Orion,
Houston.
DUKE And we're in a boulder field now that has
a population a couple size up through 15 centimeters covering
30% of the surface.
YOUNG Isn't there a better place to go than where
we are?
DUKE To get there, I don't know where it would be.

YOUNG This 015 for 2.7 -- according to them we're almost there.

DUKE I think, well, but I think we're just too close to the ray patterns off South Ray.

CAPCOM Okay, we understand. All we can do is pick the best you see.

YOUNG Don't you?

YOUNG Okay, well, let's go on a little further closer to the LM and maybe we'll come across one that isn't so -- it's more --

CAPCOM Okay. A worse problem --

DUKE -- (garble) because -- say again?

CAPCOM Right, that would be fine, except a worse problem is to get contamination from the LM. We'd rather have contaminations from South Ray, than from the LM.

YOUNG Alrighty, we just found your place $\frac{1}{2}$

DUKE There it is right over there -- see that big rock, John?

YOUNG Yep.

DUKE -- down in that big hollow!

YOUNG That ain't a hollow, that's a crater! (laughter)

DUKE Well, it's a holl -- down where I come from it's a hollow.

YOUNG Which one?

DUKE The one way -- it's over there about 50 meters, 2 o'clock.

YOUNG Okay, we're gettin -- that's up a slope, up on the side of it.

DUKE Well, I know, but it's on the side -- facing the LM, so, that would even be better.

CAPCOM You say it's on the side facing the LM? We wouldn't want to face the LM. We want not see descent.

DUKE Uh, I blew it. It's on the side of the crater away from the LM.

CAPCOM Good show.

DUKE Tony, you're co-- yeah, no way to see the LM from over here.

YOUNG Yeah, but Charlie we can't -- we can't get off and samples around.

DUKE Why not?

YOUNG Oh, okay, let's drive up here.

DUKE Ah--oh.

YOUNG Hey, you're okay. Did you get a little dust there, Charlie?

DUKE No, just a scoch.

DUKE A lot of the trouble is, John, that rock's so

DUKE -- big you can't even reach over it.
YOUNG That's what I'm saying.
DUKE Yeah, but you can sneak around on the side.
This is a steep slope right here, babe.
YOUNG That's what I was telling ya. How about
that rock right there?
DUKE That one right here is fine.
YOUNG Okay.
YOUNG Yeah, this is 180 parking, I guess, yeah.
DUKE Let's don't get too close, we've got to
sneak up on it. John, I can't get out --
YOUNG Why?
DUKE You parked right in a crater -- for me.
That's good, now.
YOUNG Yeah, but that ain't 180.
DUKE Okay, excuse me.
DUKE (laughter) Everywhere -- I think you park
in a crater -- everywhere you go there's a crater. I might
as well just take my chances. I'll take this. Thank you.
See that little hole you parked on there?
YOUNG Yeah.
DUKE Okay, Tony, we're at 176 .7 007 8.7 2.6
90 90 0 well, maybe 2 on the amps, so left for one battery is
100, 120 on two. I'm still reading off scale on low, both --
all batteries. (garble)
CAPCOM Okay. We copy that and back off
YOUNG (garble) thank goodness
YOUNG Okay. Stand by. Okay, on ye old number
2 on mode switch.
DUKE I can't get out.
YOUNG Oh, there you go again Charley.
DUKE There I go again, dag gum it.
YOUNG There you go.
CAPCOM And we'll need a EMU check.
DUKE Let me get up off the ground.
CAPCOM Okay. Charley.
DUKE Okay. I got it. Our lens dirty.
YOUNG Wait a minute.
DUKE No, it's good John. How about mine.
YOUNG Can you turn towards the sun. I think it's
okay.
DUKE Okay. Fine. Yeah, I'll get a pan out here.
YOUNG And I'll get the old high gain up.
DUKE Let's see, number 8, ha.
CAPCOM Good picture.
YOUNG Go.
YOUNG Getting pretty good.

YOUNG (garble) in there. (garble) in there.
DUKE Tony, I bet you that rover would have climbed
right on up to the top of - this is some machine, I'll tell you.
DUKE Going to turn your odd ball around and dust
it out Tony.
CAPCOM Say again Charley.
DUKE Tape A is complete. Okay, we need the surface
samplers - - samples. And echo starts with the Beta and then
the velvet and then a skim and a scoop.
YOUNG Hey, we snipped that rock over there, the
one I'm going to sneak up on Charley.
DUKE Yeah, aptitude place (garble) we don't have
that. Plus unsterio after down sun locator. Do skim 3. Okay,
so we don't get any pictures until we get the first two.
YOUNG Mag- - you got the pad
CAPCOM Okay. And before you leave the rover we'd
like you to pull bat 2 Bus D circuit breaker. We'll let you
put it back in before you drive off.

END OF TAPE

YOUNG (garbled) circuit breaker, Rog.
YOUNG That's out.
CAPCOM Okay.
DUKE And, Tony, your comment on this pallet.
The locking ring on the pallet doesn't stay up every time.
It's slightly inconvenient, but no big deal.
YOUNG A bit Charlie.
CAPCOM Okay, understand.
DUKE I'm going to get a shovel for the scoop.
And I thought we'd maybe, now I'll tell you what I got to do
is fix up -
YOUNG Start over. Double.
DUKE Pour for the CSBC.
DUKE Okay, let me get these samples out of the
way. Oh, I'm sorry.
DUKE Got to get this out of the way.
CAPCOM And, Charlie, would that back off?
DUKE Yeah, I got the DAC off.
CAPCOM Okay.
DUKE I think. Let me go check again. Okay.
Pan left, Tony. Thank's for reminding me. I had forgotten it.
CAPCOM Okay.
DUKE Your pan left will show you the rock we're
going to sneak up on.
CAPCOM Don't scare it.
DUKE It's the wrong way. (garbled) Don't open
but don't open that.
YOUNG It's between us and the LM. Between the
LM and us.
DUKE Oh, I know that, but they don't want you
to open this thing until you get right up next to the rock.
YOUNG Is that what he said?
DUKE Well, that's - not just now, no.
YOUNG Oh, yeah.
DUKE I'm going to get the other one.
YOUNG Okay. Oh, yeah.
CAPCOM We agree with Charlie, we'd like you to
get up a little closer to it and face away from yourself before
you open it.
YOUNG Facing away from myself, huh? Okay.
CAPCOM Right, you're filthy, it's (garbled)
DUKE John, are you sneaking?
YOUNG Yeah.
YOUNG Ah-h-h.
CAPCOM Gee! We're missing the great rock hunt
here.

DUKE You're just not watching him sneak, Tony.
 CAPCOM I'd sure like to.
 YOUNG A-a-a, got ya.
 DUKE What are you all doing looking at the
 feet.
 CAPCOM Which way do we go?
 DUKE We're sneaking up on it, Tony.
 YOUNG Got him.
 DUKE Let me see, John.
 YOUNG You can't see, Charlie.
 DUKE From way out here, just point it at me.
 YOUNG Yeah.
 DUKE You don't have any (garbled)
 YOUNG Okay, here's the other one.
 YOUNG You give me that one, huh?
 PAO Young and Duke are taking the surface soil
 sample now.
 CAPCOM Gee! The first lunar great rock hunt and
 we missed it.
 YOUNG Tell you something else. I leaned on the
 rock and we turned that one over. Again.
 CAPCOM Okay, did that disturb the surface on the
 other side there.
 YOUNG Yeah. The picture will show how disturbed
 it.
 CAPCOM Okay, it is important that you put this
 second one down in the area (garbled)
 YOUNG (garbled)
 CAPCOM Okay, good.
 YOUNG Yeah, we know that.
 CAPCOM Okay.
 YOUNG Okay, Joe.
 DUKE Get it.
 YOUNG Yeah.
 YOUNG In an area that that wasn't - that that
 didn't go in.
 CAPCOM Right.
 DUKE Tony, John was sneaking just like this.
 He really got up to it before it even knew he was coming.
 CAPCOM Outstanding, Charlie. Thanks for the
 rerun.
 DUKE (garbled)
 DUKE Okay, John, I'll give you a hint. Man
 that's a great sneak. Okay, that's good. Right there.
 CAPCOM Okay, just a little pressure.
 DUKE Beautiful. Pick some up on that one.
 Only on one corner. You got some on one corner, Houston.
 CAPCOM Okay, we'll have to take it that way.

YOUNG That's too bad. That's the way the ground
is.

DUKE Okay.

CAPCOM Right. (garbled) outstanding.

DUKE (garbled) about 20 percent of it's covered.

CAPCOM 20 percent is pretty good. That's fine.

DUKE 20 percent. Okay, 20 percent of one corner
is covered. I mean 20 percent of the whole thing is covered.

YOUNG These go in your rock bag, don't they?
(garble) SCB's?

DUKE Yes,

YOUNG Yeah, I don't know. Let me take them back
and put them under the seat. I don't know where they go.

DUKE I think they go in the SCB's. Tony, do
these go in the SCB's?

CAPCOM They go in the SCB that doesn't go in the
SRC.

DUKE Yeah, Okay. I've already got that one
collected. Okay John that was beautiful.

YOUNG Guess what.

DUKE What.

YOUNG Top open again.

DUKE Okay now we got to go get -- after 2
plates the (garble) I'll put the shovel. Be at a cross sun
after and a downsun on locator.

YOUNG Okay, well that's going to be hard to get.
Don't put the dirt all over there.

DUKE I didn't. I missed it. Okay. It's
going to be hard to get because. (garble) You can get -- you
can get a down cross sun from over on the this side.

YOUNG Okay.

DUKE We don't have to sneak anymore.

YOUNG We don't need a UHD anymore, do we Houston?
Are we going to need it for the ALSEP?

CAPCOM Negative.

DUKE You got one back there?

YOUNG Yeah, it's sitting in a (garble). It's
sitting in a heat flow. See how far you can throw that beauty.

DUKE Look at that. Clean across the crator.

YOUNG Beautiful. Okay, I'll go get the down-
sun. There we go.

CAPCOM Well at least in the vacuum, it doesn't
boomerang.

YOUNG Gonna run around and get a locator.
Ah ha -- Yeah Houston I'm looking back at the LM. Charlie
you can get a picture of the -- I can get a picture if I put
it on F what-you-call-it and it'll show that -- that rock is

YOUNG between us and the LM.
DUKE Sure is.
CAPCOM Hey good show.
YOUNG You can barely see the LM over there.
DUKE That -- that fills that square.
YOUNG Yeah now -- well wait a minute we got to
get a skim.
DUKE Okay.
YOUNG Can we skim where the -- can we skim where
the pristine sample was?
YOUNG Okay, no they want it right beside it,
right there.
CAPCOM We'd like the skim next to it.
YOUNG Can you see any of that stuff.
DUKE Yeah, I can see it. I can see. Okay,
here we go. Get me a bag ready.
YOUNG Okay. Okay.
DUKE Tony, I probably got 5 millimeters on that
skim.
CAPCOM Okay, that's pretty good.
YOUNG That's a pretty good little skim there.
What setting should I open this up to -- to show you these
prints we got in the vacuum here. I mean in the shadow.
CAPCOM Okay, I'll get you a number on that. Why
don't you go ahead and get the B channel.
DUKE Okay, I can hardly see in there again. Okay
I'm going to watch --
YOUNG That's going in the bag 376? You get them
in?
DUKE Yeah, no I didn't.
YOUNG Okay.
DUKE Okay, I got to widen this area.
CAPCOM Okay, 376.
DUKE Okay.
CAPCOM And John 5.6 at a 250th.

END OF TAPE

YOUNG Okay. I'll get you a little flight line of
that. Okay, and Charlies' scoop is being taken right under the.
DUKE You got it. Okay.
YOUNG Okay, there you go. That's going in bag
377, Houston.
CAPCOM Okay, 377. And you've got about 10 minutes
now and we'd like to get that CSVC.
DUKE Okay, Tony, we can turn this rock over. If
you want us to get that sample in we need an extension.
CAPCOM Okay, we understand. We're working that.
DUKE Yeah, I'll go get the CSVC then.
CAPCOM Alright.
YOUNG We'll go ahead and do the CSVC ?
DUKE (garble) start sampling while I do that.
Okay, I'm going.
YOUNG Okay, well I can get
CAPCOM Uh, John, can you turn that over by yourself?
YOUNG Well I'm going to give it a go.
CAPCOM Okay, sound like worth trying.
DUKE Ah, run back here you rascal. Getting a
sample off of it, John?
YOUNG Yeah.
DUKE Good.
CAPCOM Uh, John, you lost the bag?
YOUNG Yeah, lost my -- lost my whole set of
bags. Oh, shoot.
DUKE Can I borrow your hammer, John?
DUKE It's for this core, I think I might be
able to push it in, but.
YOUNG Okay.
DUKE Pollution.
YOUNG Okay, we'll stow it right here.
DUKE Tony, I'm 15 meters out to the left of
the
CAPCOM Rog. we're watching you, Charlie.
YOUNG Tape came loose.
DUKE Hey, there we go. Pushed it in half way
Tony.
CAPCOM Okay. And remember not to hammer this
one all in.
DUKE Yeah, yeah, got you.
YOUNG On top of that rock is a hard breccia
and I'm just going to throw it under your seat, Charlie.
DUKE Okay.
CAPCOM Okay, did you give the bag number?
YOUNG Huh?
DUKE Is it in a bag? 373.
CAPCOM Okay, 373.
DUKE Okay, Tony, that's about 7 centimeters
out.

CAPCOM Looks good to us.
 DUKE Feels good to me too, to get that hammer.
 CAPCOM Ah, it looks good.
 DUKE Yeah, that's got it all, well 3 sides.
 YOUNG Okay, now here's a picture to show where the
 top rock came out. Charlie, I got it.
 DUKE (garble)
 CAPCOM Outstanding, John.
 DUKE He did it, Houston, he turned --
 CAPCOM So you can not only sneak up on them, you
 can flip them over, huh?
 DUKE Yeah, that's a biggie.
 YOUNG Man, it looks like it's been sitting there
 for quite a while. Look at that soil underneath it.
 CAOCOM Okay.
 YOUNG (garble) stomp all over it, Charlie. Sneak
 over here and lets get some of this soil, Charlie.
 DUKE Okay.
 CAPCOM Right. Chip off the bottom and the soil will
 probably do it.
 YOUNG A chip off the bottom.
 DUKE I see a place where we can get a chip off
 the bottom, Houston.
 YOUNG Evidently you found the right boulder.
 DUKE Got it. That was a real good boulder.
 Son of a gun's been laying out here all this time.
 YOUNG Just waiting for you.
 DUKE Hey John, let me cap this. Let me cap this
 little beauty here before we lose it. Before I forget about
 it.
 DUKE Yeah, I'm coming with the scoop. What
 else do you need?
 YOUNG I need the hammer.
 DUKE I got it. Hey, why don't I just sort of
 sneak up so you don't sprinkle any dirt down in the bottom of
 this place where we turned it over.
 YOUNG Yeah, okay.
 YOUNG (garble)
 DUKE Look at that soil, it's all cake looking.
 YOUNG Yes, it is.
 DUKE Okay, let me get the soil before you start
 whacking. Okay?
 YOUNG Oh yeah.
 DUKE It's all glass covered. The bottom is glass
 covered, Houston.
 YOUNG Yeah, white glass.
 DUKE No that - the black stuff is the glass.
 That other is crystal. That's a crystalline rock.

YOUNG Yeah. Well that part of it is.
CAPCOM Very good.
DUKE And it looks just like an alikili plant,
and the cake is under it, Tony. And it's right from the'
deepest part. That sample is right in the middle which happens
to be the deep - the deepest penetration that boulder made.
CAPCOM Very good.
YOUNG Okay.
DUKE There's a sack full. 379.
CAPCOM Okay, bag 379.
DUKE Where are you going to whack it John?
CAPCOM And Charlie, your SCD is open, a rock is
going to come out.
DUKE Okay.
YOUNG Go (garble), isn't it.
CAPCOM Now, you found a real rock.
DUKE Aha!! Look at that piece here, let me
get it John. Back up. I'll go get it.
YOUNG There it is right there. (laughter)
YOUNG Can't you just pick it up with your shovel?
DUKE I don't want to get it too dirty. Oops,
there we go. Okay, we got you about a 4 centimeter chip.
CAPCOM Okay, that sounds good. Just get some
photos of it and I - I think we've done it.

END OF TAPE

DUKE Whoops. There we go. Okay, we got you about a 4 centimeter chip.

CAPCOM Okay, that sounds good. Just get some photos of it and I think we've done it.

DUKE And that's not glass, John, those are crystals. Those are big crystals. At least five millimeters with a bluish cast to them. That's going in Bag 380, Houston.

CAPCOM Okay, 380.

DUKE It looks to me like it's a shocked rock with a lot of - man, this is a gas - lot of black glass in the fracture pattern.

CAPCOM Okay.

DUKE Okay, I'll hold it.

YOUNG Hey, man (garble).

DUKE Okay, that was about a 5 footer, Tony. A little down sun and the shovel is right where the -

YOUNG Bag was.

DUKE Bag was. Close my top on that thing, John.

CAPCOM And, John, while your working on it back there why don't you close that thermal cover to Charlie's op. It's on the rear left.

YOUNG Thermal cover to - okay. Charlie, your whole rear left op is open.

DUKE Oh, heavens. I can feel the heat leak.

CAPCOM We caught you with your fly open.

DUKE (Laughter)

YOUNG Can you suggest any way to close it. I can't get it. Can't get it. Let's go back to the - hitch to the rover.

DUKE I've got to close this CSBC up - take me a couple of minutes. You could go get a sample. Okay?

YOUNG Fair enough.

CAPCOM Okay, we'd like you to pack up, John, if you could help Charlie. I think we'll have to get on.

DUKE Need help, with it.

YOUNG Unless you could get to where I could get the top of of that CSBC.

DUKE Where is it?

YOUNG It's in this SCB number 2.

DUKE This?

YOUNG I'll get it. Just stay there.

DUKE I am. I just wanted to get - I got a plung.

DUKE Okay, the plunger went right down, Tony. It's about 4 centimeters from the top.

CAPCOM Okay. And before you stick it in there, could we have the core 2 number?

DUKE Oh, yeah. I keep forgetting that.
 Thirty-four.
 CAPCOM We copy.
 YOUNG Wait a minute, Charlie.
 DUKE It fit right in. I never would have
 believed it.
 YOUNG I wouldn't have thought it, either.
 DUKE I never would have believed that. Hope
 it's down in far enough to lock it, though.
 YOUNG Have to pull the bottom -
 DUKE Huh?
 YOUNG Push the botrom shield off, then pull
 it out.
 DUKE Aaah.
 DUKE Put the spade up.
 DUKE What did you do with the shovel, John?
 YOUNG I laid it over there on the bench.
 DUKE Okay.
 YOUNG Yeah.
 DUKE (Garble)
 DUKE Tony, that 30-minute CSBC goes in the (garble)
 CAPCOM Alright, Charlie, that CSBC goes in
 the (garble.)
 DUKE Rog. Okay. Doff.
 YOUNG Okay. Back to Station 10, Charlie.
 DUKE Okay.
 CAPCOM And, Charlie, before you get on there,
 we'd like the DAC on at 12 frames per second.
 DUKE All righty-rooty.
 YOUNG If anybody told me this thing would go up
 the side of that mountain, I'd have said,
 man, I don't -
 DUKE I wouldn't believe it. This is a real
 beauty.
 CAPCOM Okay. And we need frame counts.
 DUKE Okay. Okay, Tony, I'm leaving with
 a hundred and - about 161.
 YOUNG I got a hundred - 165. I probably
 ought to change this mag.
 DUKE Do you want me to change the mags, Tony?
 CAPCOM Yeah, let's both change.
 DUKE Did he say both change?
 YOUNG Yeah.
 DUKE Okay. Tony, I don't have a black and
 white left.
 YOUNG I'm going to run off a couple, John -
 DUKE I'm out. Three frames to go and I'm out.

CAPCOM Okay.
DUKE How about that?
DUKE Okay, Magazine Bravo has got something in
it - a few frames. You used about 50 on it yesterday. And we
can use Magazine Delta. Both put color on. Is that okay,
Tony?
CAPCOM Okay. That sounds fine. Let's put Bravo
on John's if he doesn't shoot while he's driving.
DUKE Okay.
DUKE Got to hold it back and then pop it -
There you go. Hold that, then pop her loose. There you go.
YOUNG Which one, Charlie?
DUKE Delta for me and Bravo for you.
DUKE Thank you.
YOUNG Bravo.
DUKE Right in the corner there.
YOUNG (Garble)
DUKE Okay. Magazine Delta is working, and I'm
starting with frame count number - Oh, about 1.
CAPCOM Okay. Delta 1.
DUKE Dropped your bags again, John.
YOUNG Yeah. The tape came off, Charlie.
DUKE Aw, that thing did come off, didn't it?
YOUNG Yeah.
DUKE Okay. Let me come on and help you put
it on. Okay?
YOUNG Yeah. Well, the tape's still there. The
thing just peeled off under the tape.
YOUNG Boy, I want to -
DUKE It only happens in training. You got it.
YOUNG How's my lens?
DUKE Turned into the Sun. Okay.
YOUNG (garble)
DUKE It's okay. Won't even see that.
DUKE Okay. The DAK is set at F8 at 12
frames a second. And I'm not going to turn it on until we
start moving, Tony.
CAPCOM I -

END OF TAPE

DUKE Need a vacuum set at F8 at 12 frames
a second. But I'm not going to turn it on until we start
moving, Tony.

CAPCOM Okay. That sounds good.

CAPCOM And we're going to have to move out

DUKE And I ah - We're mounting up right
now.

YOUNG Bring Bravo #66.

CAPCOM Okay. We show that #66.

YOUNG (garble) Thank you Deke.

YOUNG Okay. Move switch to 1.

DUKE Huh, somebody already did it.

YOUNG Still looking at us with the big eye.

YOUNG (garble)(garble)

CAPCOM And, John, we have a small configura-
tion change. We'd like both the steering and the rear
drive powers to front Baker.

YOUNG Okay.

YOUNG All the steering.

CAPCOM That's affirmative -

DUKE (garble) (garble)

YOUNG Okay.

DUKE Man, I'm glad that you're driving
this thing. I can't reach those buttons down at the bottom.

YOUNG You want to get that before you get
in.

DUKE Yeah.

YOUNG Drive rear steering to buss breaker.

DUKE You got all that 2 CBs out Tony.

CAPCOM Right. We understand.

CAPCOM We're loading up battery 1, battery
2 is a little warm.

DUKE Okay.

YOUNG Diggin what he wants, did you get it,
Charlie.

DUKE No, I can't reach it. Steering rear bus
breaker.

CAPCOM Right.

DUKE The rear buss breaker.

YOUNG What else Tony.

CAPCOM The Drive Power to rear buss breaker
Rear Drive Power.

DUKE Rear drive power to Baker. Okay, got
it.

CAPCOM Okay.

YOUNG Now, it's back to the LM, right Tony?

CAPCOM Roger, we going back to the ALSEP area.
Station 10.

DUKE Station 10.

DUKE Yeah, that's at stop 10, right/

CAPCOM Okay, we'd like you to drive gingerly
up to the ALSEP area there and we're going to ask you to
hold the end of that broken cable up in front of the TV
and that will be the station 10 parking area. And then
you can do the station 10 tasks down to the south,

CAPCOM correction, up to the northeast.
 DUKE Okay. You mean out by the mortar
 package
 CAPCOM No, it'll be behind the mortar package.
 The task will be up to the northeast.
 DUKE Oh, yeah, to the northeast. Okay.
 DUKE That's my other northeast.
 CAPCOM Right.
 DUKE Tell you, I can't over how hilly this
 place is. It's one hill right after the other. - or ridge.
 CAPCOM It sounds like an outstanding place.
 Sure wish I were there.
 YOUNG Well, we wish you were too, Tony.
 YOUNG Okay, pictures are going.
 DUKE Tony, you're not going to see much out
 the right side of my in-motion Hasselblad because of - ah
 this DAC camera magazine affectively blocks out that
 part of the field.
 CAPCOM Okay. We understand.
 YOUNG Boy, but I itch.
 CAPCOM As long as you have the DAC on that
 sounds fine - -
 SPEAKER (garble)
 CAPCOM Why don't you swing the DAC back and
 forth a little bit occasionally during the drive and get a
 side view.
 YOUNG Anybody that ever called this place Plain,
 Gaily Plain, really didn't know what he was talking about.
 There isn't a plain around here.
 CAPCOM Right. Understand. Just like F smooth.
 YOUNG Right.
 YOUNG It's definately right. FS Smooth, I can't
 believe it.
 DUKE John picked the only flat place within
 a kilometer to land.
 YOUNG Sure glad we didn't land any on any of
 these slopes, I'll tell you that.
 DUKE (garble) - I don't know what this big
 crater is over here. This - - Tony, really the ridges here
 and we're looking off - we're now at 007. You just saw it
 in the - well, you 'll see it in the- in the 16 but off
 to the 2 o'clock of 007 at 2.6 at north heading. There's
 an old subdued crater that's probably 30 meters deep.
 YOUNG And how many meters around.
 DUKE Oh, I'd say ah -
 YOUNG 900 meters long.
 DUKE No, not that much. Better than 300
 anyway.
 YOUNG Yeah, it's 300 meters across.
 DUKE And it didn't even show on the map.
 YOUNG I tell you what it did show in,
 DUKE What?
 YOUNG Those low angle loads that we got at the

YOUNG landing site.
DUKE Yeah, I'll say.
DUKE That fender was well needed John. I'm being showered with dust.
YOUNG Yeah. Didn't mean to do that, so am I.
DUKE Okay, Tony, the - we're turning in an area that is not as - that's not quite as blocky. I'd say maybe 10 percent of surface is covered with cobbles. Still same size. There's one big boulder I just got a picture of.
YOUNG Big.
DUKE It's buried 3 meter - and it's buried - from - well it's buried all over. I was going to say it's mostly from wastings from down-slope up-slope, but it's not true.
DUKE And, off to our right is the big crater - The big deep - very subdued that just shows - I see no large rocks no outcrops at all anywhere around there. All I do is see big boulders that are apparently part of this Ray the biggest one being two meters.
YOUNG I'm making 11 clicks now on this relatively smooth region.
DUKE Tony, it's a very old surface apparently every crater here is very subdued from the half meter size up to the 4 or 5 meter size.
CAPCOM Okay. Copy that.
DUKE Completely saturated.
DUKE Here come a couple angular blocks that you just got a picture of. They remind me of the one we sampled up there at station 8.
DUKE We're getting into an area now at point 7 - 007 at 2.6 where the - it's more pebbly than cobble being 4 centimeters or so.
YOUNG My ah -
DUKE Huh.
YOUNG My what-ya-call-it just fell off.
DUKE The SCB
YOUNG No. Look and see if it's between my legs. Can you see it over there. I can't see. I think it fell between my legs.
DUKE What thing.
YOUNG My ah - my bag.
DUKE Well I didn't see it John. We've got plenty of those.
YOUNG Got plenty?
DUKE Yeah.
YOUNG Okay.
YOUNG Wondered whether to go back or not. I don't think it's worth it.
CAPCOM Okay, and could we have a range and bearing please?
DUKE Okay. We're at 007 at 2.6 and we can -
CAPCOM Okay.
DUKE Just the top of ORION.
CAPCOM Very good.

DUKE Glass covered one right there. A little round, looks like a bowling ball

YOUNG We're doing V mags, 8 clicks, 9 clicks. Cause we're going up a real steep slope.

CAPCOM Okay. Do you have a AMP?

DUKE We're all on battery 1

CAPCOM That's right

YOUNG 40, yeah.

DUKE 40, yeah. 40 amps, yes.

YOUNG Yeah.

DUKE Okay, we just topped out on a rise Tony and we're going down into another swell. I can see Flag crater off at 11:00 o'clock and we're heading zero, zero 7. It's a boulder strewn on the South side. Pointed straight ahead of us is - - between us and the lunar module - - it a - - oh, no.

YOUNG What's the matter Charley.

YOUNG The range still keeps saying 26. I think it's working.

DUKE Well anyway, you better belay that range Tony, it's been 26 for quite a while.

CAPCOM Okay. That's fine. We agree.

DUKE We can see the LM though.

CAPCOM Okay. Fine.

DUKE Now we're going down in another 2 to 300 meters, maybe 500 meters subdued crater. That's really going to be a steep slope if we go straight into it. But John is adroitly maneuvering around it.

YOUNG I'm not going down that critter.

DUKE That is really steep. Look at that.

YOUNG Look at that hole in the bottom of it.

DUKE I know it.

DUKE Tony, it's a - - it's a subdued crater without any rim at all. It is sorta oblong.

YOUNG But look at the - That hole in the bottom has a ledge in it.

DUKE I know it. Tony it looks - - this reminds me of big Sag. You know big Sag on the map north of - - west of North ray, then this whole area to our right - -

DUKE Turn the camera around there.

DUKE I wish I could give you - - Uh, I can't turn it around. Best I can do.

CAPCOM Okay. Just going by time and speed you're about 1 turn 2 kilometers.

DUKE Okay. Then our distance and range is stopped.

CAPCOM Roger.

YOUNG Our distance is - - our bearing appears to be okay.

DUKE Yeah. Hey, Tony you remember out in Hawaii those (garble) where we saw those very small Cinco craters.

CAPCOM Rog.

DUKE This looks like a big one of those.

YOUNG One down in the middle of that hole.
DUKE Yeah.
YOUNG I agree with you. That's what I was thinking.
DUKE Infact the whole area does, looks like just
a big slump. Something fell out the bottom. Cause there's no
rim to this thing at all John.
CAPCOM Okay. It'd sure be good if you could swing
the DAC over that way, if it's still running.
DUKE I can't get it over that way.
CAPCOM Okay.
DUKE It just - - it's running - - I don't have
strength in my hands. Let John turn over that way and we'll
give you a couple of these swings around. I'll give you a
couple of pictures of it. Can you make a 360 John?
CAPCOM You should be out of film in the DAC.
YOUNG Where do you want, right here?
DUKE Yeah. But - -
YOUNG Okay, that's fine.
YOUNG Did you get it?
DUKE Yeah, could you keep on going around.
YOUNG Here.
DUKE Let's just make a 360 this way.
CAPCOM Okay. And get it on your Hasselblad please.
YOUNG Hey, that's a neat way to - -
DUKE Okay, that's what we're doing.
CAPCOM Good show.
YOUNG That would be a neat way to take - -
a pan Charley.
DUKE That's just what I'm doing, taking a pan of
that thing. We got it.
YOUNG Okay.
DUKE Great. Okay, we got a pan from the rover,
Tony with a 360.
CAPCOM Okay. And if you can the DAC back off please
turn off.
DUKE Okay. Wait a minute. Well - - Apparently
it wasn't running Tony because I still got half a mag left. I'll
turn it back on.
CAPCOM Okay.
DUKE My arms are just to short.
CAPCOM I understand.
DUKE To get that thing on and off from the rover
seat. I should have turned it on on the side but at 12 frames
a second I thought we'd just run to much out. Okay, it's
running now.
CAPCOM Okay.
YOUNG I could tell you how it's doing Charley. I
can see that - - I can - - I glance at it ever so often.

YOUNG Sure is a comfort to hear those old wheels turning. You can hear them, they make a rumble.

CAPCOM We can't hear them, but I can imagine it's company

YOUNG (garble) would be terrible.

DUKE Okay, still - - still in a gobbly area Tony. They're two - - to me two distinct sizes. Those are the six centimeter size and below well around 6 centimeter and those around 15 centimeters. Cover 30 percent of the surface. Okay, I'm V max right now Houston and up slope we're going about 8, down slope about 11.

CAPCOM Good.

DUKE The nav system is gone completely John. (garble) working I don't think.

YOUNG (garble)

DUKE I don't think that bearings working either.

YOUNG Could our bus configuration cause

DUKE Don't see how. What does the nav system work off of Tony. (garble) Bat 2.

CAPCOM Stand by a second Charley.

DUKE It is.

YOUNG That's the LM up there isn't it?

CAPCOM Okay. Your nav system works off Baker and Delta so it should be on Baker alright.

DUKE Okay. Well it's not counting either range bearing or distance.

CAPCOM Okay. Is your heading working at all?

DUKE The bearings working isn't it?

YOUNG I don't think so.

DUKE Yeah, the headings working.

YOUNG I'll tell you how we get back Charley. We got to go on top of the ridge over there and we'll be there.

DUKE John, see those blocks on top of Smoky.

YOUNG Yeap.

DUKE If you head for those, the LM was right in line with those from our last stop. And I'm convinced that bearing was good from our last stop. We haven't changed much.

DUKE Okay. Tony, coming up into an area now to our 3 o'clock position, correction 9 o'clock. We're heading zero 2 zero. It looks like another one of those old subdued sag areas.

CAPCOM Okay. And we're going to cut back on our station 10 just a little bit here and we'll skip that photography of the heat flow table. We'd like you to park half way between ALSEP and the LM and do a nominal station 10 except we'll drop the trench.

YOUNG Don't want to do the trench, okay.

DUKE John, you lucked out.

CAPCOM Yeah, I bet that breaks you up.

YOUNG Surprises me.

DUKE How do the consumables look Tony.

CAPCOM Your consumables are fine.

DUKE We feel fine.

CAPCOM Okay. Good.

DUKE Okay. We'er coming up on an area now as we top a ridge that is bouldery about 10 to 12 percent of area covered with boulders greater than 50 centimeters. And it's cobbly covering about 60 percent. Looks like we apparently secondary around here somewhere that cause all this.

END OF TAPE

YOUNG And in its cobbly, covering about 60 percent. Looks like we apparently a secondary around here somewhere that caused all this. But we don't see the crater.

CAPCOM Okay, we copy that and you have enough consumables to go all long time, we just feel you've put in a good day.

YOUNG Well, why don't we stay out here and set a new worlds outdoor record.

CAPCOM Ah, we don't need that, we got to leave something for 17. We're going to set a new sleep record on this one.

DUKE Well this has been fun.

YOUNG There's that second.

DUKE Okay, there's the secondary Tony. We're coming up on our 2 o'clock -- 10 o'clock position. There's about a -- what 50 meters John you'd say?

YOUNG Yep.

DUKE 50 meter crater that's a secondary or at least it might be a primary with these blocks just being out of it. And it's quite deep.

YOUNG That's probably a prim -- I don't know whether that's a secondary or primary though.

DUKE We could tell. The block distribution seems to be radially equivalent. I think that was probably a primary punched into the old Cayley.

CAPCOM Okay and Charlie we think the DACS out of film now if you want to turn it off.

YOUNG It is empty. Reading empty.

DUKE Okay. Okay it's off.

CAPCOM Okay.

YOUNG What's that thing up there on the hill Charlie?

DUKE Where? Straight ahead.

YOUNG Yeah.

DUKE That's a rock

YOUNG I was afraid you were going to say that.

DUKE We got to get over this ridge John and we'll see the old LM. Man you have cove -- I am covered from head to foot with dust. Boy those fenders really are useful Tony, this one we lost in the back is resulted in us being double pig pen.

YOUNG You're going to have to really brush.

CAPCOM Charlie, you mean you guys are getting dirty?

YOUNG Maybe that's how we'll get our extension.

DUKE Nah, been dirty. I think we're going to probably come out a little east of where we need John.

YOUNG I wouldn't be surprised Charlie.

DUKE But if we do we ought to cross the tracks if we get too far east.

YOUNG That's exactly why I'm going this way old buddy.

DUKE Okay.

YOUNG Hang in there.

DUKE You are sharp.

YOUNG Yes.

DUKE You full bore?

YOUNG V max.

DUKE Must be pretty steep slope here. Man look at those angular blocks there would you. Around there. Tony here 30 or 40 very angular blocks 50 centimeters or so and they have the same character as the ones we sampled back so apparently a ray material.

CAPCOM Okay.

DUKE A little comment about -- a little comment about the regolith. The regolith is texturally the same throughout, the only difference is a white -- the difference in albedo that you can see on some of the fresh craters and also in the rays as we were going towards South Ray.

CAPCOM Okay, Charlie you can expect the feed water tone.

YOUNG Really an amazing vehicle. (garble) Okay, I just got a flag of some sort. (garble) Is that you or me. You expecting a flag Houston.

CAPCOM Right can you reach the carry water on the rover?

DUKE Houston. Houston.

CAPCOM Go ahead Charlie.

DUKE Okay I'm going to aux water on. (garble) the lamp John.

YOUNG How about that sports fans.

DUKE Right on babe. Right on.

YOUNG Okay Houston we just topped at the ridge and the LM is about 200 meters from us. I think they've had -- we've had a comm drop.

CAPCOM John Houston.

YOUNG Go ahead.

CAPCOM Okay, we had our comm drop out here and I understand Charlie got his water switched over.

YOUNG That's affirmative.

CAPCOM Okay.

YOUNG Yeah, Charlie's on aux water.

DUKE Was you expecting that?

CAPCOM Yeah, we tried to give you a call but we had our comm drop out just about that time.

DUKE (garble) how about swinging right and let me get a picture of that John. With the Rover in -- a little bit more. We want a nominal station 10. Search between the

DUKE core.
CAPCOM Charlie your feed water pressure is building.
DUKE We stop (garble) over here to the right by
that --
CAPCOM Okay we've got it now Charlie, your feed
water pressure's going up.
DUKE Okay, I was on man
CAPCOM You're in good shape.
YOUNG (garble) between the water package and the--
water package and the Rover.
DUKE No. Yeah that's a good place to park. I've
got to go over here and get the penetrometer in line. Yeah
that'd be good. Water package in the Rover.
CAPCOM Sounds good to us.
DUKE We won't have any trouble navigating with-
out that navigation system but it's just keeping them posted
to where we are.
CAPCOM Right when you get parked there, we'd like
you to reset your nav.
DUKE Okay.
YOUNG Okay, which way we want to park on this
one Charlie.
DUKE Pointing South again 180. Hook a right. I
can't believe how hilly this place is. There's not a flat place
around.
YOUNG Right, except where that LM is.
DUKE Except right there where that LM is.
YOUNG It's really good, it saved us alot of time.
DUKE Okay, it's resetting Tony.
CAPCOM Okay.
DUKE Okay and you got -- well the heading says
we're at 176 65 whats the num -- I can't read the number 2 amp
hour.
YOUNG Number 2 amp hour says -- it's reading as
110.
DUKE Yeah, 65 and 110 105, 110 and 120 off scale
low, off scale low and off scale low, off scale low.
CAPCOM Okay, we copy that.
DUKE Wait a minute the forward -- the forward
motors are not off scale low, they're just coming up about --
make that the rear motors are about 210.
CAPCOM Okay 210 and we'll need an (garble).
DUKE The forward motors are off scale low.
CAPCOM Okay.
DUKE Okay let me get out of this thing.
YOUNG Okay, mine is holding pressure at 395, I'm
between minimum and intermediate. I don't have any flags and

YOUNG my O2 is so covered with dust, I can't tell what it is. But it looks like -- Tony I think I got -- dad gummit. I can't tell.

CAPCOM That's okay John, we read 35 percent down here.

DUKE Well I got --

YOUNG Okay, yeah it looks above 25 anyway, 25, 35, there you go.

DUKE That's what mine is too Tony, about 33 and I got 3.8 min cooling and I've got just a water flag. I got the (garble) in the aux water's on.

CAPCOM Okay, sounds good.

DUKE Look at this place it is filthy.

YOUNG Okay Houston, going to --

END OF TAPE

DUKE Look at this place, it is filthy.
YOUNG Okay, Houston, going to 3.
CAPCOM Okay.
YOUNG Okay, lets see, here's the core. I need
the fork. Okay, we got 'em.
DUKE And we're gonna upstart on the double
core, Tony.
CAPCOM Okay, that sounds good.
DUKE And John, since we're running behind here,
I wonder if could operate the penetrometer?
YOUNG A piece of cake.
DUKE Good.
YOUNG Why don't you just give us an extension.
DUKE Tony, how about an extension, you guys?
We're feeling good.
CAPCOM We understand and we can understand why
you wouldn't want to get back in, but we'd like you to get
back in on time and you've got a lot of finds there, so don't
worry about it.
YOUNG You said all we're gonna do tonight is
sit around and talk.
CAPCOM Well, we like to hear you talk.
DUKE Tony, we could really -
YOUNG Yes especially on a hot mike. (laughter)
CAPCOM That just makes it more interesting.
DUKE Ten minutes and we'll get all this done,
Tony. How about 10 minutes, Tony? Please.
DUKE John, you got the shovel?
YOUNG Look at that, Charlie.
DUKE What?
DUKE I don't see. What? What? What?
YOUNG Somebody up there likes us.
DUKE That bag number 4, do you know where it is?
YOUNG Came off.
DUKE Came off, huh?
YOUNG And it's hanging between the fender and
the frame. That is amazing.
DUKE Yeah.
YOUNG Okay, can I have your hammer? Double
core, okay, could be any where out in front of the Rover.
I'll go out - and - over - antenna.
DUKE Come on, Tony, pretty please.
YOUNG We're working in it.
CAPCOM Okay, we'll go ahead and give you 10
minutes. How's that? Just shows that we love you.
DUKE Atta boy. Lets hear it for old flight and
atta boy for flight.
YOUNG Yea!!!!

DUKE Okay.
YOUNG Want me to help you with the penetrometer?
DUKE Well, I've got the double core right now.
CAPCOM Okay, we'll still drop the transient and
do everything else as nominal.
DUKE I betcha I don't get this in here but I'll
try.
YOUNG I think you will.
DUKE I don't know. Okay, that's pushed in.
YOUNG Let me do that and you do the penetrometer
'cause I know how to do that one.
DUKE Okay. That's a good swap.
YOUNG Dad-gum-mit.
DUKE John, see if I got the red dot on my
camera, it stopped running.
YOUNG Sure do. (garble) spinning it once for
me. There over at (garble).
DUKE That's got it.
YOUNG Super.
DUKE I'll get it.
YOUNG (garble) as far as you can push it in.
DUKE Okay. You want a hammer on this?
YOUNG Yeah.
DUKE Okay, now the stuff to -
YOUNG Take it apart with -
DUKE take it apart with is back in the back.
YOUNG Okay.
DUKE They want you to take both of them off
together and then ram it home before you separate the two.
YOUNG Understand.
DUKE And the top of the bottom one is back here
next to the LSM.
YOUNG Okay.
DUKE Okay, Tony, which - want me to start with
the .5?
CAPCOM Right, it will be the .5 - well actually
you have the 2/10 on there, why don't you do the string of 2/10
and we'll come back and get the .5 near the double core.
DUKE Well, no, I took the 2/10 off.
CAPCOM Okay, fine.
DUKE I don't have anything on here now.
CAPCOM Alright, press for the .5.
DUKE Okay. It gets hard down there, doesn't
it, John?
YOUNG Yeah, I don't think it's going to go.
YOUNG Let me - if you want me to give it, Houston,
before I quit.
CAPCOM Okay, it's not going down at all?

DUKE Now, your getting it a little bit, John.
It's going in, John, about a quarter inch a stroke.
YOUNG It figures.
DUKE No, a little bit more than that.
YOUNG Ahhh!
DUKE I did the same thing.
YOUNG Ohhh!
DUKE I did the same thing.
CAPCOM John, it's too late to change your mind,
you gotta hammer that one, no trenches.
YOUNG Crazy. Should of kept my mouth shut.
DUKE Dad-gummit, that thing came off again.
YOUNG It may have a bad latch in it.
YOUNG Let me get a good one, Houston.
CAPCOM Okay, John, you've probably hammered on
that long enough, why don't we just call it enough.
DUKE It's in. John, it's in. That's far -
YOUNG How far do you want to drive it?
DUKE That's far - that's far enough.
YOUNG Drive it all the way in.
DUKE Yeah, they don't want anymore than that.
CAPCOM Okay, that looks good.
YOUNG Gee, it came right back out, too.
DUKE That's the amazing part.
YOUNG That is amazing.
CAPCOM Okay, John, you want to turn that over
that stuff may come out of that.
YOUNG Okay. Okay, I finally got that 5/10 back
on.
DUKE And I got number 6, Tony. Is that okay?
I don't think I've used 6.
YOUNG Where's the cork at fat Charlie?
DUKE In the - in the HTC. How about an answer
Tony.
CAPCOM Say again Charlie.
DUKE I'll bypass, no I'm on 9 -
CAPCOM Yea, 9's it, Charlie.
DUKE I'm going to bypass 9 and go to 10.
CAPCOM Okay, that's fine, too.
DUKE I just passed it on, I'm going to go to
10.
CAPCOM Okay.
DUKE Okay, let's see.
YOUNG Okay, it's full in the bottom of it anyway.
CAPCOM Okay. And that one should be very near
the double core, Charlie.
DUKE It is, within 3 meters - 2 meters.
CAPCOM That's fine.

DUKE Is that okay?
DUKE Okay.
YOUNG Look at that, the core tube caps go on and
everything.
DUKE Okay, that bottomed it out, Tony.
CAPCOM Okay, we can see that.
DUKE About .5.
CAPCOM That looks good.
CAPCOM Why don't we go to a 2/10 and do it just
in the same place.
DUKE I'm just almost - Okay, and then work
towards the -
CAPCOM Work towards the deep core.

END OF TAPE

CAPCOM (Garble) just about the same place -
DUKE In fact, almost - Okay. And then work
towards the -
CAPCOM Work towards the deep part.
DUKE Is this the last time we use this -
Is this the last time we use this thing?
CAPCOM It should be.
DUKE I can't remember. We don't have - On
EVA 3, we don't use it, huh?
CAPCOM Not right now.
DUKE Well, I'll put it back, anyway.
DUKE (Garble) could you move over a skosh
and let me -
YOUNG Yeah, that rammer jammer only went in
an inch.
DUKE That's okay.
CAPCOM That's okay, as long as it gets out of
the cap.
YOUNG (Garble)
DUKE Yeah. Well, you got it so full - you've
probably got it so full -
YOUNG Did that mess them up?
DUKE Nah. You're going to leave that cap
on it, anyway.
YOUNG (Garble) That cap stays on.
DUKE Yeah. Til it gets back to Houston.
There's the two tens. Going to 11, Tony.
CAPCOM Okay.
YOUNG Hey, where's the top thing that goes
on it, Charlie.
DUKE Okay. The one for the bottom is right
there by the LSM, on top of the palate. And there's a core
(garble) goes on the - the cap goes on the top part. You
see it?
YOUNG I sure don't.
DUKE Okay. Right by the LSM, by the LPM,
there's a screw-on just like on the top part.
YOUNG Yeah.
DUKE Okay. That screws back in the bottom part.
YOUNG Yeah, but what -
DUKE There you go. You got it. There.
That's good. Now ram that one and then put a cap on the
other one and give them the numbers.
DUKE Okay, Tony. Here come the two tens.
CAPCOM Okay. Sounds good, Charlie.
YOUNG What are these with, Charlie? The STB?
DUKE Put them into my (garble)
YOUNG Okay.

YOUNG The numbers of these things -
 DUKE Okay, the two tens almost went in all the way.
 CAPCOM Okay, Charlie, we see that.
 YOUNG Okay, the upper one was 45, the bottom
 one was 4.
 CAPCOM Okay, John, sounds good.
 DUKE Okay, Tony, be advised I'm sorry that
 I'm spiking this thing out occasionally, but this is the
 only way we can do it.
 CAPCOM That's fine, Charlie. We see the problem.
 DUKE Okay, I'm moving - I've got two more to
 do, cycling to 12. This is about a fourth of the way, right
 here. Okay. Okay, number 12.
 CAPCOM And, John, we should wait on your pan
 until Charlie's through there.
 YOUNG Understand.
 DUKE Okay. That's about the same distance,
 Tony.
 CAPCOM Okay.
 DUKE Cycling 13.
 CAPCOM Hey, John, while you're sampling, there,
 you might look around and see if you see any of that particular
 basalt.
 YOUNG That's what I'm looking for.
 CAPCOM Good show. I told them you were.
 DUKE What? Okay.
 CAPCOM We see that one went all the way in.
 DUKE Not quite. Well, there it is - all but
 about 5 inches.
 CAPCOM Okay.
 DUKE There was - that one was -
 CAPCOM Okay, and John, stand by for a feed water
 tone.
 YOUNG Just got it.
 CAPCOM How's that?
 YOUNG The hose.
 CAPCOM Go on aux water.
 YOUNG Okay.
 DUKE Cycling to 14.
 CAPCOM Okay, Charlie.
 DUKE And I'm right by the double core - I
 mean the deep core.
 CAPCOM Okay, that sounds good
 DUKE Golly, the ground's pretty beat up with
 - Okay, it's pretty beat up with footprints. Should I go to
 a pristine area or stay here?
 CAPCOM Just move it over out of the footprints.
 DUKE Okay. I've got a good spot. About two
 meters toward the central station.

DUKE That one's going all the way in, too.
I didn't lose my balance.

CAPCOM Good show.

DUKE But I can't get up.

DUKE There we go.

DUKE (Garble) Roll (garble)

CAPCOM Okay, Charlie, one flat plate by the
double core, and that'll about do it.

DUKE Okay. Okay, Tony, the neck con-
nector to the printed circuit on the heat flow is still
in.

CAPCOM Okay. We understand.

DUKE The - It looked like the silver part
broke off right where it mated into the printed circuit.

CAPCOM Okay. We copy that.

DUKE Prints on the moon. I can't believe
it.

YOUNG Well, Charlie, I just don't see any
particular basalt.

DUKE I don't either.

YOUNG It's sort of like, uh, they're always
there when you need them.

YOUNG Crummy thing.

CAPCOM And, John, as Charlie takes that center
trace we can go ahead and take your pans.

YOUNG Okay, Houston.

DUKE Back window 15.

CAPCOM Okay. Good show.

DUKE And it's somewhere between this mass
of footprints - Aha, there it is. Okay, Tony, right beside
double core.

CAPCOM Okay, Charlie.

DUKE Okay, that was a pretty good one. I think it
going to turn out and it was - it went in about
6 centimeters.

CAPCOM Outstanding.

DUKE Yeah. Let me try one out here in a
pristine area to see if that's a couple of meters away,
here. I wonder whether all that foot walking over there
might have just fouled that up.

DUKE Nope. It was pretty good, Tony. That
one went in about the same.

CAPCOM Rog. We had that one on TV.

DUKE Okay.

YOUNG Charlie?

DUKE Yeah.

YOUNG Can you see if my lens is dirty?

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DUKE Yeah, in just a minute.
DUKE Turn around this way, John. I've got to
look in the Sun.
YOUNG Which way do you want me to turn?
DUKE This - Toward me. Toward - looking -

END OF TAPE

YOUNG Charlie.
DUKE Yeah.
YOUNG Can you see if my lens are dirty.
DUKE Yeah, just a minute. Turn around this way
John I have to look in the sun. Towards me - - light dust
but not much, it's okay.
YOUNG Very fine.
DUKE Okay. Houston I collected one sample which
was a sharp angular.
CAPCOM Okay. And we'er going to have to pack up
and head home.
DUKE Okay. Home is about 50 meters away.
YOUNG Can I put this back here Charley.
DUKE Yeah.
DUKE There, I thought we had lost a break here
for a minute but there it is.
YOUNG And that sample is going in bag sample 381
and I'll shoot the pan here in a second.
CAPCOM Okay. 381.
DUKE And it was a black rock but I don't think
it was a particular basalt, I think it was a breccia.
CAPCOM Okay.
YOUNG However, they'er the same type we've been
sampling. Going into sample bag 4 on top of the - - sample
9 samples.
DUKE Okay. Tony I'm up front count 91 on magazine
Delta.
CAPCOM Okay. We copy Charley.
DUKE Tony does the - - can't remember does the
CSDC CBSC go into the rock box.
CAPCOM Yes, it does.
DUKE Okay.
DUKE Hey John, I'm going to take that SEB #2
my camera and I'm heading home.
YOUNG Okay.
YOUNG Boy, is this fun. Good, that pan completes
me up to frame of 89 Houston.
CAPCOM Okay. John 89.
YOUNG Okay, the mo - - the mode switch is going
to one.
CAPCOM Okay, And John when you get inside we have
a configuration change in LRV.
YOUNG Charley's already back at the LM.
CAPCOM We saw that before he went on.
YOUNG He walks faster than I do.
YOUNG Okay. start with configuration change.
CAPCOM Okay. Except where the PWM select and
the drive enables, we would like everything back to nominal.
Circuit breakers in and drive power on bus Delta, steering

CAPCOM in bus Delta. Tha's rear steering.
 YOUNG Circuit breakers are in, drive power on
 Delta and steerings on Delta.
 CAPCOM Okay. Good show. And we understand you
 reset before you came.
 DUKE Tony, looking back up -
 DUKE Yeah, I did that.
 CAPCOM Okay.
 DUKE Reset the NAV.
 YOUNG Yeah, we'er reset now.
 CAPCOM Okay. Fine.
 DUKE Okay. Tony do we put as many core tubes
 as we can in the rock box also?
 CAPCOM We'll work that Charley.
 YOUNG Boy, that's neat.
 DUKE How about the core tubes, do we put all
 the core tubes in the rock box also?
 CAPCOM Okay. Charley we can put 4 tubes plus CSVC
 in the rock box and then plus what documented samples you can
 get in there.
 DUKE 4 core tubes, CSVC documented samples, gotcha.
 CAPCOM Rog.
 DUKE Okay. Looking back towards Stone mountain
 Tony - -
 YOUNG Charley let me park the LM right there.
 DUKE Okay. The LM is already parked but you
 sure can park the rover.
 YOUNG Alright. Fair enough.
 DUKE Okay. Looking back towards Stone mountain
 Tony I don't see the rover tracks.
 CAPCOM Okay. That's fine. We're a little bit
 behind the timeline there Charley. I think we better get
 closed out.
 DUKE Okay, we're doing that right now as fast
 as we can.
 APCOM Okay. I understand.
 DUKE John's back at the - - John's at the rover.
 I'm going to put you on 3.
 YOUNG Okay. 3. LRV powered down - -
 YOUNG (garble) Charley
 CAPCOM And John as you get off the rover we'd like
 you to take a picture of the UV camera, it should be about
 f/5.6 at 250.
 YOUNG Roger.
 CAPCOM You don't have to go up to it.
 YOUNG Where do you want me to take that picture?
 CAPCOM Yeah, just take it anywhere as long as we
 can see that location that's all we're looking for.
 YOUNG Okay.

DUKE Okay, you're aligned Tony with signal strength
about 4.

CAPCOM Okay, we got a good picture.

DUKE TV remote. Okay.

YOUNG Actually get the normal old thing ought to
catch it Houston because the - - but not in sun but there sure
is a lot of sun behind it, and on it and all that. Very strange.
It's shadow.

CAPCOM Okay. Guess they wanted to see into the
shadow a little bit.

YOUNG (garble) that.

YOUNG Okay. Well I mean the lag - - I mean the
shadows, you'll be able to see it fine.

YOUNG Okay. Houston you want to reset?

CAPCOM Roger. Reset and I have a new setting.

YOUNG Okay.

DUKE Let me watch them we don't score now. Dig
that man, it did work. It's working.

CAPCOM Okay.

YOUNG And what are the new settings, Houston. And
azimuth 326.

YOUNG 326

CAPCOM And elevation 16.

YOUNG Okay.

DUKE Hey, Tony I'm putting core tubes 29, 43, 45,
and 54 in the rock box.

CAPCOM Okay. We copy that.

DUKE The BSCC is in the rock box.

CAPCOM Okay.

DUKE You want an unbagged rock in the rock box
Tony. I don't think you do.

YOUNG Okay, a 326 and what's the elevation Houston.

CAPCOM 16.

YOUNG 16.

YOUNG Okay. Houston, 326 and 16. Thta's set and she's
going.

CAPCOM Okay. Charley, yeah you can put unbagged rocks
in the SRC.

DUKE Okay.

YOUNG Got the hammer Charley?

DUKE It's in the thing here.

YOUNG Okay, see. I think this bag here has got so
little in it we can - -

DUKE Let's empty it in SRC, there's some more
can go in the SRC.

YOUNG Okay. This is got those two what's you call
it in there.

DUKE What you mean?

YOUNG All those - - yeah, ok. they can't go in SRC.

YOUNG Where do they go, in the ETV.
DUKE Uh, no in a rock box somewhere. Why don't
you put them back here on the one - - in mine John, back on
the rover here.

YOUNG Okay.

DUKE Back on the rover.

END OF TAPE

DUKE No you're in a rock box -- in a rock bag
somewhere. Why don't you put them back here on the one, in
mine John? It's back on the Rover here.

YOUNG Okay.

DUKE Back on the Rover.

YOUNG There you go.

DUKE We're packing up the rock box Tony.

CAPCOM Okay, good.

DUKE Got the rocks in it. The liner's coming
off. And I put the other core tubes in a -- tell you in a
minute.

YOUNG Beautiful, they just fit right in the top.

DUKE Good. What's the number on that one John?

YOUNG That's SCB 2. No, Yeah 1.

DUKE Okay and the -- John's crystalline rock
in the 2 more for the 2 other core tubes go in -- in number 3 Tony.

CAPCOM Okay.

DUKE (garble) if you got -- where'd those 2
core tubes go that you had?

YOUNG I put them in here. 4 and 45 are in your
seat.

DUKE Oh okay, then I got them already.

YOUNG Okay. Okay my DAC goes -- here let me un --
let me unload the -- the backpack. Okay. My backpacks already
been unloaded. Okay. We got 2 bags out that we -- yeah extra.
Well good.

DUKE Okay, we're going to have 3 -- I don't
know how full mine is.

YOUNG Okay, I got it. (garble)

DUKE Got it.

YOUNG Thats got it. Okay. Okay. We hardly got
any rocks in it at all.

DUKE I know if we -- I think I can stuff them
in this other -- other bag over here John.

YOUNG Okay. I'll take SCB 1 and put it by the
footpad Charlie.

DUKE Okay. Yeah, I can stuff them in here. Let
me get these core tube caps out of here. Out of one and put
them onto the (garble). Okay. I put them on the HTC, how
would that be?

YOUNG That's fine, that - that cap is empty.

CAPCOM Okay, Charlie you called out that you put
2 core tubes in John's crystalline rocks in SCB 3, that should
have some empty core tubes and core caps in it. Could you
straighten that out?

DUKE No, we -- it had 2 core tubes emptied and
we used -- we used the bag on it, that's true.

YOUNG Hold it Charlie.

DUKE Excuse me John. That was set for EVA 1 --
I mean EVA 3.

CAPCOM There's no problem as long as you took those
core tubes core caps out.

DUKE Well we got the core caps out but we didn't
get the core tubes out and I don't know whether -- we must have
used them.

YOUNG This here has a couple of core caps in it
too Charlie, number 1.

DUKE How about core tubes?

YOUNG That's a aff, couple of core tubes in number
1.

DUKE Oh good, okay, we'll take those out.

YOUNG Are they empty.

DUKE Yeah. They're empty. Okay put them under
my seat.

YOUNG Sure they're empty.

DUKE Yeah, I'm positive, unless they got a cap
on, they're empty. Okay Tony, we found them.

CAPCOM Okay, good show.

DUKE Okay, SCB 3 is going to go up with us, the
SRC is going to go up with us and I'm packing the ETB now.

CAPCOM Okay.

YOUNG And I'm going to put these 2 bags under
your seat Charlie.

DUKE Okay.

YOUNG Now here's a -- something like that (garble)
criter.

DUKE You can just leave those bags out John.

YOUNG Will bags weather alright out here Charlie.

DUKE Oh yeah.

CAPCOM Oh I think they'll make it each DC is with
mags.

YOUNG Okay.

DUKE Where's your camera John. I need your
camera. Okay. Got it. North to the left feet LFB unload.

YOUNG Okay, we're both unloaded. Back to ETB.
Wait a minute. I should be doing it.

DUKE Its got it in my checklist too so --

YOUNG Okay now you're going to have to -- going
to have to change that some because we got a little more than
2 HTC back.

DUKE John could you get those goodies in the
left seat bag there in my bag and pass them over.

YOUNG Okay.

CAPCOM Okay and verify you got those rocks in the
bags that you passed under the seat.

DUKE Yes that's -- let's see, there's one -- no

DUKE there's one over there I think at the corner--
it's at a -- no we got them all. Yeah there it is. That's it.

YOUNG That's a glass ball that I found out there
Houston. I never said nothing about it.

CAPCOM Good show, let's bring that in.

YOUNG Might as well.

DUKE John here's another glass -- piece of glass,
hollow ball.

YOUNG Yeah, let's put it in this here space.

DUKE Okay.

YOUNG Aw rats.

DUKE This thing just bounce out of your hand --
it's like

YOUNG Okay I got magazine Lima, the 500 going back
under the seat. Better we'll drop it in the dirt.

DUKE As clean as that seat is.

YOUNG Okay, got to get to it. Camera over there.
Okay, okay Houston. Okay SCB number 1 is sitting over there
on a foot strut Charlie.

DUKE Okay. Your mikes coming off the 16, batteries
into the Sun.

CAPCOM Okay, we see that Charlie.

DUKE Into the ETB. Okay, do you want me to turn
your LCRU power off Houston.

CAPCOM No we can't do that.

DUKE Say again.

CAPCOM Okay, point the camera lens directly away
from the Sun and down first and then you can turn the LCRU off.
Also, when you get back to the LRV, we'd like the LRV readouts.
We didn't catch those. And we'll need LCRU blankets all the
way over.

DUKE Okay, point the camera away from the Sun.
(garble) They're all the way open now. Yeah, the camera directly
down sun and down huh?

CAPCOM And down to the ground. That's right.

YOUNG My (garble) has stopped.

DUKE Directly into the Sun?

CAPCOM Negative, away from the Sun and down.

DUKE (garble) there's the sun, there's the camera,
there's the down.

CAPCOM Looks good.

DUKE How did that old nursery rhyme go? Oh I
know.

YOUNG Okay the side covers are coming open.

DUKE You know what you sounded like then?

YOUNG What?

DUKE That old nursery rhyme. This is the church,
this is the steeple, open the door and here are the people.

YOUNG Okay, 2 padded bags, we're just going to
leave. One set maps we got, 1 mag from DAC, 1 mag. Okay, it's
all loaded.

DUKE Padded bags are staying under the seat
Houston.

CAPCOM Okay.

DUKE Okay and the ETB's coming over and I'm going
to hook it on the -- and the batteries do need dusting.

CAPCOM Alright we saw it come up those (garble)

DUKE Do you want me to do that John, I can reach
better.

YOUNG I can get it.

DUKE Those LCRU's yeah. Man we got alot of rocks.

CAPCOM Good show.

YOUNG Only way to fly Charlie.

CAPCOM The name of the game.

DUKE And we don't have big muley yet -- don't let
us forget to get big muley here.

CAPCOM Ah, we wouldn't do that.

DUKE That beauty's coming in if I have to sleep
with it. Okay, I'm going to get pallet 2 out with enough food
for the Trojan army.

END OF TAPE

DUKE with enough food for the Trojan Army.
(laughter). Oh look at that, John, it just comes right out
of there, and I had so much trouble.

YOUNG Okay, pallet 2, MESA, LOH can MESA. Hummm.

DUKE Do we have that, Tony?

CAPCOM You already have the LOI can up there.

DUKE We already got it up there, don't we?

CAPCOM That's right.

DUKE Yeah, that went up yesterday.

YOUNG Okay, then we won't worry about that.
Okay, Houston, as you know, the one I have the most trouble
getting is that mirror in the middle which I understand is
just a NAV system anyway. But I got it as best I could
and it's a lot cleaner than it was.

CAPCOM Okay, understand.

YOUNG Both of the Rover batteries mirrors are - are
as good as they were when we got here.

CAPCOM Okay.

DUKE This one needs dusting, John.

YOUNG I know, I ain't dusted it yet.

DUKE I'm going over and kick off on the strut
here. Boy that shadow is getting short.

YOUNG Maybe we landed later than we thought,
Charlie.

capcom Okay, and it's 7 hours right now.

YOUNG Okay.

DUKE This is the best way to get the dust off,
John, is kick against the strut. Look at that stuff go.

YOUNG Yeah, but I - wait a minute, don't go
anywhere yet.

DUKE I'm not.

DUKE Pat your hands, kick your feet.

DUKE Okay, 2 SCB's we got. Looks like we're
going to have everything. Pelvit (garble) ascent stage,
2 SCC's, ascent stage. Okay, John, I'm gonna take one of
these up to the ascent stage.

YOUNG Okay. Careful now you're about to kick -

YOUNG Oh rats.

YOUNG Laughter.

YOUNG Did kick it open.

YOUNG Wait a minute, move Charlie, and let me
get it.

DUKE Okay. Okay, I'm sorry.

YOUNG It's not a question of - where's that sample
that was in it?

DUKE There you go. The top just wasn't closed.

DUKE Okay, I got the bag.

YOUNG No wait a minute. Doing the sample.
DUKE Another sample.
DUKE The things not designed to fit in there,
John.
YOUNG It goes in there.
DUKE Not flat like that, I bet you.
YOUNG Yes it does, I put it in there a minute
ago.
DUKE No. Got it.
YOUNG I figured it would really be good cause
we'd keep the top closed.
YOUNG And the way to close those things is
band on them. There you go. Okay, that's good.
DUKE Okay, I'm gonna just go up and take one
of the up, John, and then I was going to come back down. I'm
not going inside. Okay?
DUKE You want to take the brush?
YOUNG Yes.
DUKE Here you go.
YOUNG Charlie, why don't you let me get them.
Let me clean you off, you go up in there, hook on and let me
just carry those things upstairs.
DUKE Hook onto what?
YOUNG Hook on to the upstairs.
DUKE I'm not going to hook onto anything up
there. I'm going to stand there and wait on you.
YOUNG That's what I mean. Go on up there and
let me just bring them on up.
DUKE You've got 4 things to bring up.
YOUNG No problem.
DUKE But you want to (garble) whatever you want
to do.
YOUNG okay, let me pull my visor down. I can't
believe it.
DUKE Tony, do we look as dirty to y'all as
we do to each other?
CAPCOM No, you just look pristine.
YOUNG Okay. We'll we've got 2 hive and I got
the feeling we're going to stand up tonight, cleaning each
other off.
DUKE That's good enough, John. Clean off my
RCU, that's the only other thing I wanted.
YOUNG You mean clean the top of it off?
DUKE There we go, let me get you.
YOUNG Wait till you find out that these rocks
have a specific gravity of 1.0. (laughter) Somebody's in
trouble.

DUKE You know, I'm not sure w'ere doing much good.

YOUNG I'll agree with you.

DUKE But, really don't forget to kick your feeties.

YOUNG I know it.

DUKE Okay, turn around. Mainly on the back of the PLSS and the back of the helmet, and that kind of stuff, cause we -

CAPCOM And while you're working on it there, verify your antennas are down.

YOUNG Good thought, but their not.

DUKE Not yet. Okay, I'm knocking it off now.

YOUNG Now wait - don't - don't Charlie.

DUKE I wouldn't hit you hard.

YOUNG Listen, I don't - nobodys ever tried on impression. (laughter).

DUKE That was with the dealie that came loose here.

YOUNG He's just knocking me in the head, Houston, in case you're wondering what's going on.

DUKE Got it off, though, you gotta admit.

YOUNG Just the dirt off.

YOUNG Knock your visor loose.

YOUNG Okay, let me see down here.

CAPCOM Okay, you're getting pretty far behind now, we're gonna have to ask you to go on in.

DUKE Okay, we're - I'm going up right now.

YOUNG Charlie's going in right now.

DUKE We were just dusting off, we're pretty dusty. Can you hand me the pallet when you jump up John?

YOUNG Yeah. Wait - Okay I sure will. Put this on the LCRU.

DUKE Okay.

CAPCOM From the nominal time line, your down about 30 minutes now.

DUKE Yeah, well, we'll be - we'll get in right in a hurry.

CAPCOM Okay, fine. And as you walk past that MESA, make sure the blankets are down. We are seeing a temperature rise.

YOUNG The blankets are down on the MESA.

DUKE They are down.

CAPCOM Okay. Fine.

DUKE How can you see - I didn't know you had any thermometers down there. John could you -

CAPCOM And we would like those water readouts before you pull those circuit breakers, John.

YOUNG You want the pallet, right?
DUKE Yeah. Tony, the MESA's partially in the
Sun, that's probably the reason.
CAPCOM I don't know.
YOUNG Yeah. Got it.
DUKE Uh huh.
YOUNG If you want, I'll take these smaller
blankets and put over the top of it, Houston.
CAPCOM We'd like you to just get on in.
YOUNG Okay. How are you coming, Charlie?
DUKE I'm up on the porch.
YOUNG Okay, Houston, you want to recheck the UV
camera?
CAPCOM Yep, we got a setting.

END OF TAPE

YOUNG How are you coming, Charlie?
DUKE I'm right up on the porch. Okay, Houston,
you want to reset the UV camera?
CAPCOM Yep. We've got a setting.
DUKE Okay.
CAPCOM Okay, it's azimuth 100 and elevation 77.
DUKE Okay. Going to Reset. That wheel's
moved more than 180.
CAPCOM That may look pretty close to the LM,
but we have to take it the way it is.
DUKE Okay.
DUKE It's going to be pointing right at the
LM. Do you think -
CAPCOM Elevation is 77.
DUKE Alright. Maybe it'll be over the top
of it.
YOUNG Okay. Azimuth 100, elevation 77.
DUKE Hey, Tony, I'm inside.
CAPCOM Okay.
YOUNG Standing up, Charlie?
DUKE Yeah. And I got about a ton of dirt from
somewhere.
YOUNG Okay, elevation 100 - azimuth 100, elevation 77,
set and pointed. It met with the LM okay. That's straight
overhead.
CAPCOM Okay. Good show. You're looking at the
(garble).
DUKE Ah, the (garble), hopefully.
YOUNG Charlie, are you standing up?
DUKE Yeah, I'm standing up.
YOUNG Are you ready for a rock box?
DUKE Yeah. I'd like to get this palate.
You can start on up.
YOUNG Okay.
CAPCOM And, John, have you closed the circuit
breakers on the LRV.
YOUNG That's affirmative.
CAPCOM Okay. Fine.
DUKE What happens to it if you don't pull
those breakers? Run off somewhere?
YOUNG Okay, Charlie.
YOUNG UH, UH, Charlie.
DUKE Why?
YOUNG It's too near the camera to be slinging
stuff out there.

DUKE Oh, I'm sorry. It's just that one little
old dinky thing. That's all I was going to do.

YOUNG Okay. Okay, here comes the palate.

DUKE Okay. Got it?

YOUNG Yeah.

DUKE Okay.

YOUNG (garble) I'm going to throw it by the -

DUKE Okay, you got two rocks, two STB's and
and an ETB to come up. You could probably lower the S-Band,
and the SRC right there while you still got two ETB's.

YOUNG Two ETB's?

DUKE Yeah. I mean one ETB and a - two STB;'s.

YOUNG Right.

DUKE You might put one STB on that ETB line,
its real light.

YOUNG Okay, here you go, Charlie.

DUKE Packs in.

YOUNG Okay. (Garble)

DUKE I got it.

YOUNG (Garble) hurt you?

DUKE I got it now.

YOUNG Okay, don't lock the hook. Just unhook
it. (Garble)

YOUNG Okay, there it comes.

DUKE Okay, I got the hook. Okay. 2 STB's and
we got it.

CAPCOM Okay, John, Charlie. Sounds good.

DUKE John, you're not going to believe the
dirt on this floor.

YOUNG Yeah, I am.

DUKE What are you doing?

YOUNG Oh, I'm trying to set something up
here.

DUKE Okay.

YOUNG Did you throw something out of there?

DUKE No.

YOUNG You didn't?

DUKE No.

YOUNG Maybe we've got visitors.

DUKE That got it?

YOUNG Yeah.

DUKE Okay. How do you read, Houston?

CAPCOM We're copying you, Charlie.

DUKE Okay. I just heard a little squeal
back there; curious.

CAPCOM Alright, we have (garble)

YOUNG (Garble)

DUKE These bags come open - these STB's
come open when you don't want them to and you can't get them
open when you want them to.

CAPCOM Okay. We'll call that Charlie's law.

DUKE Yeah.

DUKE (Garble)

YOUNG (garble)

YOUNG You okay?

DUKE Yeah. I'm fine. I just having a (garble)

YOUNG I got it.

DUKE Got it? Now let me get behind the hatch.

YOUNG Okay.

PAO This is Apollo Control. Young and Duke
are apparently back in the LM cabin now, preparing to get
the hatch closed and begin repressurizing. This EVA has
been going on for about 7 hours 20 minutes.

DUKE Okay. Come on, John. Here we go.

DUKE Okay, you've got to come right, John.

Is everything okay?

YOUNG Yes, it's okay.

DUKE Okay, I'm in the hatch.

DUKE Okay pull the hatch and repress.

YOUNG That ain't what you do now.

DUKE Yeah, it is. (Garble)

DUKE Okay. (Garble)

YOUNG (Garble)

DUKE Okay, we shouldn't have closed that hatch
all the way, we've got our water still on.

YOUNG That's what I said.

YOUNG I'm sorry (garble).

YOUNG There we go.

DUKE Okay, I'm turning the water Off.

YOUNG I can't reach it.

DUKE Oh, there you go, you were caught on that
bracket.

DUKE Okay, there you go.

END OF TAPE

DUKE Okay. Go ahead.
 YOUNG (garble) towards OFF.
 DUKE Okay.
 DUKE Read your next step.
 YOUNG Close hatch and lock.
 PAO This is Apollo Control, we continue to have the noisy communications. We've been experiencing, while using the Lunar Module Omni directional antenna, we are receiving these signals through the 210 foot dish at Gold Stone, but the communications is quite noisy. We did hear Charlie Duke mention that they were getting ready to close the hatch and begin repressurizing. We're still counting the time of this EVA. It's now 7 hours 22 minutes We'll continue to count up the elapsed time until cabin pressure of the Lunar Modules reaches 3 and a half pounds.
 SPEAKER (garble) closed. Hatch (garble)
 DUKE Okay. (garble) applies to.
 YOUNG What applies to. (garble)
 PAO And we've just had the report from based on telometry data here that the LM cabin pressure is coming up. They're beginning to repressurize now.
 SPEAKER PLSS O2 off.
 DUKE (garble).
 YOUNG No. I'll tell you when.
 SPEAKER Okay.
 YOUNG Okay (garble)
 SPEAKER (garble)
 SPEAKER (garble) joint.
 YOUNG (garble) is OFF.
 SPEAKER Both (garble) is off. - -
 PAO And we're watching the cabin pressure up now to 3.5 which gave us a total duration of that EVA from cabin D pressurization to the 3.5 level to repressurizing to 3.5 pounds per square inch. A total duration of 7 hours 23 minutes 26 seconds.
 SPEAKER (garble) 4 6. What a contraption. Isn't that amazing?
 CAPCOM Okay. You guys had a 7 hour 23 minute EVA.
 DUKE Beautiful.
 YOUNG Beautiful.
 DUKE That's super, that's a lot of fun.
 Let's go back out.
 CAPCOM (laughter) tomorrow Charlie, tomorrow.
 DUKE I mean it, it's real great.
 YOUNG PLSS O2 off. PLSS O2 off. Cabin warning light off, cabin pressure stable at 465 (garble). Okay, both EVA distance configuration 15 minutes.
 DUKE Okay. Verify EVA 3B.
 YOUNG Yep.

DUKE Minus 2.2 (garble).
YOUNG Now wait until you see that (garble)
(garble) that's (garble)
SPEAKER (garble)
DUKE (garble)
YOUNG (garble)
DUKE (garble)
YOUNG (garble)
DUKE Okay.
DUKE Must admit my fingers are a little
tired though. Just a skosh.
SPEAKER Could you turn up the (garble) lighting when
you get a chance John, let's get a look at the caution panel.
YOUNG Okay.
DUKE It's good, real good shape.
YOUNG (garble)
CAPCOM And, John. That OPS latch on Charlie's
OPS may be hot to touch since that cover was up.
YOUNG Let me see. Yeah.
SPEAKER (garble)
YOUNG Okay. It's cool as a cucumber. Thanks
for your(garble) thrown in amateur advice. (laughter)
CAPCOM So much for a thermal analysis.
YOUNG Yeah. It's about 72 degrees F
SPEAKER (garble)
SPEAKER (garble) zero.
DUKE (garble) open. Remove until we're
right here.
YOUNG Yeah. (garble) valve open first.
SPEAKER (garble)
DUKE I'm not either.
DUKE That was fun.
YOUNG Sure was, Charlie.
DUKE (garble)
SPEAKER (garble)that's your.
YOUNG (garble)
SPEAKER (garble)
SPEAKER (garble)
SPEAKER (garble)
SPEAKER (garble)
SPEAKER (garble)
SPEAKER (garble) disconnect that LM open (garble)
blue to red, G horizontal (garble) PLSS pump off. And
fan off.
YOUNG Off switch.
SPEAKER Okay. (garble) I go to suit closed.
YOUNG We're suppose to be still (garble).
DUKE (garble) over here (garble) thinking
about EVA 3. Okay.
YOUNG Thank you.
DUKE Houston, the lunar dust smells like
gun powder.

CAPCOM We copy that, Charlie.
DUKE Really, a strong odor to it.
CAPCOM Yeah, remember on hammering on rocks
fresh rock powder does have a strong odor.
YOUNG (garble)
DUKE I hope it's not the oxygen. But it goes
away after a little while.
YOUNG (garble) that's for sure.
DUKE But it is really a strong smell.
YOUNG Boy, I'll tell you.
CAPCOM Okay, and we need a cabin gas return
valve open.
DUKE Okay. Stand by.
DUKE Okay. Right now we're in a suit gas converter
flow. EGR cabin gas return is open, and my flow is on and
John's is in disconnect. Do you want to go to push
cabin.
CAPCOM That's affirmative push cabin.
DUKE Okay. You got it.
DUKE Feels nice and cool.
YOUNG (garble) (garble)
SPEAKER (garble)
SPEAKER You can cut me off now.
SPEAKER (garble)
DUKE (garble) connect LM.
YOUNG There you go.
DUKE That sounds like a good deal.
SPEAKER (garble)
DUKE (garble) is yours that kind of rock
(garble)
YOUNG (laughter)
YOUNG There you go.
DUKE (garble)

END OF TAPE

YOUNG Hey, Bill. It's great fun. Don't see anybody,
(garble)
DUKE Don't think we have anything on that data
(garble)
DUKE Yeah, it's data (garble) down very hard.
YOUNG You got yours hooked up (garble) yet. Your water.
DUKE Yeah.
YOUNG Okay. I gave it some water Dick.
DUKE This mode 0 mode and audio TV open.
YOUNG Did you get your pump off? Your fan and pump?
SPEAKER (garble)
DUKE Audio closed.
CAPCOM Okay. Fellows. Take an audio test.

PAO This is Apollo Control at 150 hours 25 minutes. The lunar module cabin pressure is back now to about it's normal level of around 5 pounds per square inch. During the next hour and half Duke and Young will be getting things clean up, stowed in the cabin, getting out of their suits and that will be followed by a debriefing on the EVA. We'll then allow them about 30 to 45 minutes to eat. They'll recharge the potable life support systems in preparation for the 3rd EVA tomorrow. And get ready for an 8 hour rest period which is scheduled to begin at about 154 hours 30 minutes. During the 2nd EVA while Young and Duke were on the lunar surface, Ken Mattingly in the command module Casper was making good progress carrying out all his flight plan activities, photography and operating the experiments in the scientific instrument module bay of the service module. Flight Director Donald Puddy who has been following the activities of the CSM reports that everything is looking good with the spacecraft and the experiments. With one relatively one minor exception the laser altimeter is returning about 50 percent useable data. About 1 out of every 2 altimeter readings that we're getting back is not usable. But with that exception, all the SIM bay experiments appear to be functioning properly. And Mattingly is reported to be in good spirits. Very chipper with the words that Don Puddy used in describing him. And things going very well aboard Casper. At the present time the CSM is in it's 39th revolution of the Moon. And we'll be losing radio contact about 15 more minutes as Ken Mattingly goes around the corner behind the Moon. When we next see him about 45 minutes thereafter he'll be in his 40th revolution.

PAO This is Apollo Control at 150 hours 33 minutes. We don't expect to hear a great deal from Young and Duke while they're getting the cabin in order, getting out of their suits. We have about 9 minutes of contact left with Ken Mattingly in the orbiting command module Casper. We're going to switch

PAO And we'll switch over at this time to the
live conversations with Ken Mattingly.

CASPER Okay, let me see where that is now. Okay,
that's at 151. That's verify.

CAPCOM Roger, because you are going to configure
it here at LOS and the word is on the high gain angles believe
your meter.

CASPER Okay, I'll use the meters.

CAPCOM And some more on this configure. We're
coming up here on LOS, apparently it's important that the DSE
be configured on a time, it depends on when they start to rewind
so for this rev, they want you to configure the DSE at 150 45.

CASPER Okay, 150 45 as opposed to 43. All righty.

CAPCOM And Ken I've got 1 more thing for you is the TI
pad. A block data.

CASPER Okay, standby while I get my other book.
Okay, I'm ready to copy.

CAPCOM Okay Ken and to let you in on what's going
on here. We were going to give you a TI 54 pad and they're
jocking around and because of the plane change and the plane
change is going to come about 169 hours so they're going to
give you a TEI 48 pad now and give you a TEI 55 pad at about
164 hours, so this will be TEI 48 SPS G&N 38620 plus 059
plus 125 168 5.

CASPER Hank, I can't hear you again. How about
asking -- asking the comm guy downstairs if he can patch it dif=
ferently or something. It hasn't sounded like this until just
the last oh I've been noticing it the last couple of revs, but
this thing, I can't even understand you.

CAPCOM Ken how do you read now?

CASPER Yeah, that little burst was good Hank.

CAPCOM Okay, let's try it again. There's been alot
of noise in the room here.

CASPER Now your getting drowned out again.

CAPCOM Okay Ken we'll try it again.

CASPER Thank you now it's just like the other loops
are --

CAPCOM Can you read me alright now Ken?

CASPER No I can't Hank -- it it's -- upkey your mike
a second and let me tell you what it sounds like. It sounds
like that we've got the other loop -- the other air to ground or
the flight directors loop or something like that -- thats got
a box key, that comes on and I don't hear it when you make a
short statement but when you're on for and hold it down for any
length of time then all this other talking comes on and it
sounds like I can probably hear Tony and I'm not sure who all
else. Nothing is very clear and it's exceptionally noisy and
it just sounds like -- sounds like trying to hold a conversation

CASPER at a football game is what it sounds like. And its been annoying, but now it's getting to the place where I can't even read you.

CAPCOM Okay, its -- it must be coming from somewhere else Ken, we've got everybody in the room real quiet now.

CASPER Yeah, I don't think -- think it's possible for all that noise to be coming through from your open mike. That's the reason I wanted to see if comm tech could chase it out or something.

CAPCOM Okay, we're about 2 minutes from LOS, I don't guess we're going to be able to get this pad to you. We're not going to see you for another rev about 3 hours.

CASPER Okay, well I'm not going to -- I'm not going to burn PEI 48, in the meantime anyhow. But I can't -- I'm not going to copy it properly if I can't hear you.

CAPCOM Okay, we'll work on this thing and see if we can't have it better where we get comm here in a rev and a half.

CASPER Alright, thank you very much Hank.

CAPCOM Do you still have the noise while we're talking now?

CASPER Yes sir. It doesn't come on immediately as soon as you start to talk, it -- it builds up slowly like you start to talk and it takes about 1001, 1002 and then comes on like a big rush and swells up and after a couple of seconds you're completely drowned out.

CAPCOM Okay, it must be in the lines. They're checking now.

CASPER Alright, thank you very much. I appreciate it. And I promise we won't go anywhere in the meantime.

CAPCOM And Ken if you still read, we think we got your flight plan squared away until you go to sleep tonight. There won't be anymore major changes.

PAO This is Apollo Control at 150 hours 42 minutes. We have about 5 or 6 seconds before we lose radio contact with Ken Mattingly as he goes around the corner of the Moon on the 39th revolution and we'll be switching back to the circuits with ORION on the lunar surface, although we haven't had a great deal of conversation with that crew in the last 35 or 40 minutes. You heard Ken Mattingly describe a communications problem, apparently on the uplink. We were getting good solid noise free communications from the command module but he described a situation that sounded as if there were at first background noise coming in from the room here but on evaluating it, it became obvious that this was not noise pickup from the CAPCOM's mike but was rather something that was getting into the lines. We have the network communications officer

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PAO checking into the situation to see if we
can have it resolved --

END OF TAPE

PAO You heard Ken Mattingly describe a communications problem apparently on the uplink. We were getting good solid noise free communication from the command module but he described a situation that sounded as if there were - at first - background noise coming in from the room but on evaluating it, it became obvious that this was not noise pickup from the CAPCOM's mike but was rather something that was getting into the lines. We have the network communications officer checking into the situation to see if we can have it resolved prior to the next acquisition of CASPER. We are getting some communications now from the lunar module. We'll switch over to that at this time.

ORION tonight.

ORION Neither do we, we were going to use it to sleep with. At least take it easy on the - on the - figure things out.

CAPCOM John, sorry, you're in the hash again.
I missed that last -

ORION He said we're gonna use it for sleeping.

CAPCOM Great, just what we wanted.

ORION Okay, Ed, my OPS (garble) pressure is 6100 and John's is 5900. Over.

CAPCOM (garble)

ORION Houston, we finished initial PLSS recharge - Charlie has 95 and I had 92. Over.

CAPCOM Roger, John, say again your percentage.

ORION Houston, 92 percent.

CAPCOM We copy, John.

PAO This is Apollo Control Houston at 150 hours 49 minutes ground elapsed time. In the mission control center Houston we've just had a change of shift, with Gene Kranz taking over as flight director and his white team of flight controllers coming aboard at this time. Meanwhile aboard ORION, the crew of Apollo 16, astronauts John Young, Ken Mattingly apparently in the process of performing their stowage duties aboard the spacecraft and doffing their spacesuits. We'll keep the line up and continue to monitor. We're at 150 hours 50 minutes ground elapsed time.

END OF TAPE

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CAPCOM Orion. Houston.

DUKE Go ahead ahead.

CAPCOM Say if you're in a position to where you want to listen. I've got a little sports news for you. If you'd like to hold off let me know when.

DUKE Okay, go ahead. We'll listen.

YOUNG Ed, we're just changing out this battery (garble)

CAPCOM Okay. Right now we've got the New York won 3 to 1 over Celtics Seltics in their series. The Lakers have finished up theirs 4 to 2 over Milwaukee. Understanding bad to see the outcome of their best of the New York and Celtics game. And the Astros have finished up 4 in a row today.

DUKE Won or lost.

CAPCOM Now that wasn't a kind question. Won of course.

DUKE Super. Great.

YOUNG There goes Charley's chicken.

CAPCOM They'll run some more news down here before long. And when you get your battery management I'll give you the new procedure Charley, just give me a call.

DUKE Okay, stand by.

END OF TAPE

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PAO This is Apollo Control Houston at 151 hours
9 minutes ground elapsed time. We're preparing to start the
change of shift news conference in the main auditorium so we'll
take down the line at this time; record any conversation that
takes place between the crew aboard the spacecraft ORION and
Mission Control and play that back following the conference.
This is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control Houston at 152 hours 4 minutes ground elapsed time. We accumulated approximately 10 minutes worth of conversation with the crew of Apollo 16 during the news conference so we'll play that tape for you now.

CAPCOM (garble) Houston would you give us a clue as to where you are in the checklist.

ORION Okay we just finished changing out my

LiOH (garble)

CAPCOM Okay.

ORION Houston, ORION.

CAPCOM Go ahead.

ORION Okay, Ed we had one small -- looking over the gear here -- we had one small casualty, John's OPS antenna has about 2 inches broken off the top of it. That's the only thing we could see wrong with the seat. Over.

CAPCOM How much Charlie?

ORION About 2 inches and I checked the comm when I noticed it when he came in, I checked the comm and he was still sounding the same to me.

CAPCOM Okay, he sounds good to us. Do you happen to know when it occurred? Or when you first saw it?

ORION Rog. I think it was during the ingress. We got behind and y'all reminded us of it once. We were still working and we didn't do it at that point when we started dusting, Tony said get on in, so we forgot it. I got in and then when I saw John coming up the ladder, it was gone then.

CAPCOM Okay, so we're missing a couple inches of antenna. Understand.

ORION Okay Ed we're ready for the battery management.

CAPCOM Okay Charlie, I'll give you the overall plan here to put the lunar batt on the LSP bus, take steps 1 and 2 off and batts 3 and 4 on. I'll give you the details if you feel like you want them.

ORION Oh no, we got that. No problem.

CAPCOM Okay.

ORION Okay, let's go ahead. We got batts 1 and 2 off, 3 and 4 on and lunar batt is on the LSP bus.

CAPCOM Okay Charlie.

ORION Ed, I don't see the lunar batt carrying much of a load here. Is (garble) satisfied?

CAPCOM Standby Charlie. We're observing that. It's your go.

ORION Okay. Houston ORION.

CAPCOM Go ahead Charlie.

ORION Okay Ed, I got some weights for you. I'm ready to copy.

CAPCOM Standby one.

ORION The SRC number 2 is okay.

CAPCOM Go ahead.

ORION Okay, the SRC number 2 weights 41 pounds. SCB 3 which is in sample containment bag number 3, weighs 30 pounds. SCB 1 which is in sample containment bag number 4, weighs 26 pounds. Over.

CAPCOM Okay, SRC 2 is 41 pounds. SCB number 3 which went to the containment bag 3 is 30 pounds. SCB number 1 which is in containment bag 4 is 26 pounds.

ORION That's Charlie.

CAPCOM Keep going like that, you may have to throw away muley.

ORION Ain't (garble) yet.

CAPCOM Okay doke.

ORION Houston ORION.

CAPCOM Go ahead ORION.

ORION (garble) gather (garble) on a metabolic assessment board (garbled).

CAPCOM Charlie come at me again on that please.

ORION Rog. We're just curious -- those metabolic rates today. (garble) Could you have the Doc work on that for us and let us know in a little while.

CAPCOM Yeah, I got it Charlie. On John the average ran about 785 average and the LMB on you Charlie ran about 870.

ORION Okay John's 785 and me 870. Thank you.

CAPCOM The way I predicted on both of you is 890, so running to the good there.

ORION That's great. Thank you.

CAPCOM And ORION, the Doc's telling me you were running about 88 average heartbeat today.

ORION Okay, thank you. Is that both of us?

CAPCOM That's affirm, both of you.

ORION Houston, this is ORION, how do you read?

CAPCOM ORION, Houston did you call.

ORION That's affirmative. I'm out of my suit, Charlie's getting out of his suit.

CAPCOM Fine. I understand that John's out of his suit and Charlie's coming out now, is that correct?

ORION Yes sir.

CAPCOM Okay. ORION Houston.

ORION Go ahead Houston.

CAPCOM Rog. Ken's passing overhead now, could you give him a call and verify that he's on left VHF antenna, we're not receiving the VHF downlink on the (garble) data. And come up on transmitter A (garbled) is that right? Okay, belay that is transmitter A voice and B receiver.

ORION Hey Ken, how do you read receive. Over. Ken this is ORION. How do you read. Over. Hey CASPER, this is ORION. Houston, you said VHF A transmit B receive right?

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CASPER
ORION

That's correct ORION.
(garble)

END OF TAPE

ORION Hey, CASPER, this is ORION, this will be good day to transmit (garble) right?

CAPCOM That's correct ORION.

ORION (garble) these days.

ORION Houston, what do you want me to tell him again?

CAPCOM To verify he's on the VHF left antenna.

ORION Roger.

ORION CASPER, this is ORION. Over.

ORION CASPER, this is ORION. Over.

ORION CASPER, this is ORION transmitting end of Y. Houston wants to verify that you are on the left antenna. They are not receiving your test. Over.

ORION Is he overhead just yet?

CAPCOM That's affirm. He's just about directly overhead. We kind of suspect he's off the head set since he is maintaining radio silence for the (garble).

ORION I'm sure he has.

CAPCOM Okay, ORION, Houston, thank you very much for giving it a try and reconfigure you VHF back to a moninal configuration.

ORION Okay, we'll do it. Sorry we couldn't raise him, but I believe he's off the headset. If he's still maintaining radio silence he don't hear.

CAPCOM We're all convinced you're right, John. Thank you.

ORION Okay, Charlie's almost out of his suit now.

CAPCOM Good show.

ORION You know, Houston, it would sure be handy to have something like a false floor lay down on this thing, because we sure can't stand on the vorax.

CAPCOM You'd like a bath mat, eh, Charlie.

ORION Do what? Say again.

PAO This is Apollo Control Houston at 152 hours 16 minutes ground elapsed time. We're back up live again. And in the mission control center standing by now for the start of the post-EVA debriefing. Our CAPCOM presently on duty is Ed Mitchell. The reference to the broken antenna, this on the back of the oxygen purge system, it's John Young's antenna that was referenced. 2 inches were broken off. We had a similar problem on Apollo 15 when Jim Irwin broke his - the same antenna right at the base. We'll start monitoring further and see if we have any conversations prior to the start of the EVA debriefing. We're at 152 hours 17 minutes and this is Apollo Control Houston.

ORION Okay, Houston, we're ready for the - we're ready for the liftoff time. We're for REFs 40 to 45. And the EVA debriefing.

CAPCOM Okay, John, we're ready to go when you're ready.

ORION Okay, you give me the refs 40 to 45 and we'll try to (garble) Over.

CAPCOM Okay, we've got T41 154 plus 02 plus 12; T42 156 plus 00 plus 41; T43 157 plus 59 plus 13; T44 159 plus 57 plus 44; T45 161 plus 56 plus 16 and that's it.

ORION Okay, readback, 41 154 02 12, 156 00 plus 41, 157 plus 59 plus 13, 159 plus 57 plus 44, 161 plus 56 plus 16.

CAPCOM Okay, good readback.

ORION What ground - what ground elapsed time do you have now Tony?

CAPCOM Say again John.

CAPCOM Okay, your GET is 152 plus 20.

ORION 152 plus 20.

CAPCOM Right and I can give you some times in your surface checklist for the different periods if you want them.

ORION Yeah, I would appreciate that. We're (garble) we don't have any idea what time it is. Not that it makes any difference. Charlie said it's 8 o'clock here.

CAPCOM Okay, John, I didn't catch that. Do you want these times for page 5-5?

ORION That's affirmative.

CAPCOM Okay. On page 5-5. The EVA debriefing should start at 151 plus 55. Eat period 152 plus 10. PLSS 02 and H2O recharge 152 plus 55. Okay, on 5-6 the mid-course conference or MCC conference correction is 153 plus 25. Pre-sleep is 154 plus 10. And rest period begins at 154 plus 35. That's on the bottom of 5-7 and that goes for 8 hours.

ORION Hey, say again when the - when the rest period, where it goes.

CAPCOM Okay, the rest period at the bottom of 5-7 is 154 plus 35 that's for 8 hours. And we're gonna try to get you to bed even early.

ORION There you go. Tony, you can't believe how dirty it is in the lunar module.

CAPCOM Okay, a couple of bits of information we'd like from you before the debriefing. We'd like to know if you drank all the in-suit drink.

END OF TAPE

CAPCOM Get some before we start the debriefing.
We'd like to know if you drank all the insuit drink.

ORION Every drop. Both of us.

CAPCOM Good show. Did you drink any water when
you got back in and can you estimate how much.

ORION Yeah, we had a lot. There's no way to
tell it unless you keep count of the swallors and we didn't
do that this morning.

CAPCOM Okay. I understand. And we'd like to
remind you that you have some ointment in your medical kit
if your fingers are sore there. And just to make you feel
warm I'd -- the next hand out we go to the 210 foot dish
and we'll have high bit rate and data for all your entire
sleep period.

ORION Yipee.

CAPCOM (Laughing)

CAPCOM Okay. When you're ready we'd like to go
on with start these questions in term of geology debrief.

ORION On the water we'er reconsidering, we went
down like a cool one, after a geology trip you know what
I mean.

ORION That's about the same amount.

CAPCOM Okay.

PAO This is Tony England back at the CAPCOM
position at this time.

CAPCOM Okay. Discussing station 4 here, we'd like
your general impression of the rocks. Especially the bigger
blocks. You described mostly breccias and white (garble) rocks.
Were there any others and could you just talk about them a
little bit.

ORION We didn't see any that we recognized
(garble) told about it. I think the big blocks (garble) just
big brothers of the littler ones. That secondaries that we
were working up there was fantastic. It really
was. (garble) That's about the only rock we saw.

ORION No, we're not really sure. It's our first
guess what those rocks are breccias or crystalline. I'm sure
you know that they both have some very definite colors. I
only saw (garble) except for the ones I got today. That's the
one I picked up at station 5.

ORION I think Tony my views the same. We had
only a predomenent South ray ejecta all around. Most of the
smaller rates were given in Descartes. And it just occurred
to me that everywhere we were there was a boulder field
appearing of varying intensity and you could see when we were
up to four you could look back at South Ray and see the rays
coming out (garble)

ORION (garble) like you said about the rays at
South Ray. Some are white and some are black rays. It's just a
little layer of dust. I didn't see hardly a clear surface all
day long, I felt right at

ORION home (garble) Everybody said the rocks would be crystall clear ones. They were just all covered up. And it's my opinion (garble) that made all the differences in the world. The rocks (garble) Does that answer your question Tony?

CAPCOM Right. The station for 4, 5 and 6 area you mentioned that 5 and 6 got progressively - - the surfaces got progressively firmer. I wonder could you see any contact or a gradual thing.

ORION No we sensed it when we got off the rover and felt it under our feet. It's a soft spot. It was on the top (garble) firmer as we went out like you said when we went out to 6. And you just noticed it when you got out.

CAPCOM Okay. I understand.

ORION (garble)

CAPCOM And station 4 5 and 6 also, we're pretty confident that the ejecta of the rock at station 4 were from South ray. At 5 and 6 particularly though. Was there any indication that the craters either by their orientation or some secondary blocks laying around that the source in fact was from South ray.

ORION Yeah, I would think that the crater itself it was probably South ray Crater. Although the rocks generally looked more rounded (garble) pattern (garble) The pattern of rocks were all in the far wall away from South ray craters.

CAPCOM Incidentally the back room is really impressed and very excited about your choice of sampling on the inner wall of that crater. I guess it was at 5 or 6 and things that you did. You had a good chance there of getting real Descartes. I think they've got it in a box. What they're thinking right now is that the areas where you're able to kick up and see white underneath are ray materials. But you didn't see that at 5 and 6 so we think you may have got Descartes there.

ORION Okay. I tell you one thing. If this place had air it'd sure be beautiful.

ORION It's beautiful with or without air, the scenery up on top of Stone Mountain. You'd have to be there to see this to believe it. I hope it showed that good on television.

CAPCOM It sure did John. We're really impressed. Hey, we have a bunch of questions we'd like to ask. But we're going to knock it off and let you get some sleep and we'll try to pick your mind when you get home here. But there's one thing in the rover there, the drive from station 10 back to the LM did you notice that the NAV system worked. Whether you got any distance on there particular.

ORION No, (garble) about 25 yards from the LM. I didn't notice (garble)

CAPCOM Okay. Did the station - - did the numbers go to zero when you reset at station 10.

ORION That's affirmative.
CAPCOM Okay. We copy that.
ORION Okay. I tell you that (garble) is like real mule.
CAPCOM Okay. And we've lost one piece of hardware here. We wonder where SCB 2 went.
ORION Okay. We've got it in the SRC and it's on the rover. We're going to use it tomorrow.
CAPCOM Okay. I understand you dumped it into the SRC and the bag's on the rover still.
ORION Yeah, Tony just like we did in training there. (garble) could never get the SRC closed.
CAPCOM Okay. Good show
ORION (garble)
CAPCOM We were wondering what happened to the FCSC that was in the pocket there, but it looks like we'er in good shape.
ORION The FCSC is back on the rover. I was looking at it just before we got in.
CAPCOM Okay. That the extent of debriefing here. Why don't you head on into your meal and we'll have your flight plan updates for the conference period.
ORION Okay. We'll do it.
CAPCOM And what our plan is, we've got a lot of flight plan pages here about seven pages worth and we'll put them in your conference period and if we don't get them all up tonight we'll send you to bed on time and we'll sneak them in the morning.
ORION Okay. Tell the men in the back room we really enjoyed it. By golly that view from Ston Mountain is something else.
CAPCOM I'm sorry John our comm is pretty bad, could you say again.
ORION Won't say it again. Just want to say thanks to the back room boys .
ORION Tony, I'd like to say the same thing. I think they did a great job and they kept us thinking and on our toes and came up with the right suggestions at about same time (garble)
CAPCOM Hey, I went back in the back room after the EVA, there's estatic back there. I know we didn't see exactly what we expected to see but we think you got everhthing that we went up there for.

END OF TAPE

CAPCOM We didn't see exactly what we expected to see, but we think you've got - you've got everything that we went up there for. We're in really good shape.

YOUNG That Rover really - some of the - if you could have seen some of the things that that Rover did today. You wouldn't believe it.

DUKE You just wouldn't believe the ridges and valleys and ridge rilles here. I tell you that the local slope might be 2 or 3 degrees, but, man, that Double Spot is (garble) picked that place to land. It's the only level spot around here. Any place else, you'd really be in trouble.

CAPCOM Okay, in about 50 minutes, we're going to get the 210 here, and we'll have pretty good comm, so why don't you go eat now and do whatever you want, and we'll give you a call when we get the 210 and see if you're ready for the update.

YOUNG Okey-dokey.

PAO This is Apollo Control Houston at 152 hours and 36 minutes ground elapsed time. We're signing off our conversation, at least for a little while, with John Young and Charlie Duke, as they start their supper. The thanks extended to the back room referred to the Science Staff Support Room. That was Tony England who was talking back and forth with the crew during the EVA debriefing. We presently have some payload numbers on the samples which the Apollo 16 Commander and Lunar Module Pilot acquired today. The net payload of rocks is 82 pounds. In SRC 2, we had sample contents of 28 pounds, the container weighing 13 pounds. In bag number 3, the contents weighed 29 pounds, the bag weighing 1 pound. In bag number 4, the contents weighing 25 pounds, the bag weighing 1 pound. We're at 152 hours 37 minutes and continuing to monitor. This is Apollo Control Houston.

END OF TAPE

ORION Houston, Orion. Over.
CAPCOM Go ahead, Charlie.
ORION Tony, we'd like to start on the PLSS
02 recharge thermal type thing in an hour. Could you all confirm
for us.
CAPCOM Charlie. I didn't understand your ques-
tion. You say you'd like to do it in an hour?
ORION No. The checklist says connect LM 02 to
PLSS output 02 still open and close so we suppose to verify
that IHR has elapsed since initial recharge.
CAPCOM Okay. We'll start you out hour.
ORION No, you know when we first got back
in and we plugged up the oxygen to the PLSS we were suppose
to (garble) well, now, if it's been an hour, we can go ahead with
the other top off.
CAPCOM Standby one.
CAPCOM Okay. It's 2 hours since you started
the original charge. If your question is can you go right
ahead to the top off with the top off, the answer is yes.
ORION Okay, Tony. We'll proceed. Thankyou.
CAPCOM Okay Charlie. Sorry to fowl up here.
Our comm is really bad.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4-22-72 CST 20:57 GET 153:15 MC-585/1

PAO This is Apollo Control Houston at 153
hours 16 minutes ground elapsed time. Our countdown clock
in Mission Control shows some 1 hour and 14 minutes until
the start of the rest period for John Young and Charlie
Duke aboard the Orion. And meanwhile, we're standing by,
awaiting the start of the conference period with the Apollo
16 crew prior to the start of this rest period. This is
Apollo Control Houston.

END OF TAPE

CAPCOM ORION Houston go normal voice and high bit rate we have the 210.

ORION Okay Tony, you ought to have it. Over.

CAPCOM Okay, that is outstanding. I can almost understand what you're saying Charlie.

ORION Yeah, get the grits out of my mouth. Is that our friends in Australia tonight?

CAPCOM Okay, we're on Goldstone 210.

ORION Oh our friends out on the Mohave's. Good.

CAPCOM And why don't you give us a call when you're ready to take these flight plan updates.

ORION Will call.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4-22-72 CST 21:15 GET 153:33 MC-587/1

YOUNG
a little bit.
CAPCOM

Houston, we're going off biomed for
Okay.

END OF TAPE

PAO This is Apollo Control Houston, at 153 hours 49 minutes ground elapsed time. The telemue flight controller here in Mission Control, reports John Young and Charles Duke almost to a completed with their PLSS recharge. So we'll be standing by shortly for the conference period with young and Duke, to start. We're at 153 hours 49 minutes continuing to monitor, this is Apollo Control Houston.

CAPCOM Orion, Houston.

ORION Go ahead. Over.

CAPCOM Okay. We'd like to try to get the bulk of this flight plan update up tonight because we want have the 210 foot dish until 2 hours before lift-off. How are you doing up there?

ORION We're coming right along, Tony.

CAPCOM Okay.

ORION We'll be with you as quick as we can, honest.

CAPCOM Understand.

ORION I don't think you do, but it's all right.

ORION Okay, Houston. We've got the bulk PLSSes recharged with water and the in vent oxygen top off.

CAPCOM Okay.

ORION Hey, Tony. What's your best guess about where we landed?

CAPCOM About where you landed?

CAPCOM We're just going by what you said. Originally we had you I think, 150 meters north and 200 west. And you said today that you were just north. We thought that the first estimate of 150 north and 200 west was comatable with the LRV data that you got the NAV data. We kind of like that - -

END OF TAPE

CAPCOM 200 west and you said today that you were just north. We thought that the first estimate of 150 north to 200 west was compatible with the LRV data that you've got, the now data, we kinda liked that one but I haven't seen anything from the planners yet.

ORION Okay, it's pretty hard to tell from where we were on Stone Mountain it looks like I could be double spotted. We were just about - from where we were at station 4 to Stone Mountain I could see double spot and they were just a little past it, but not much.

CAPCOM Okay, we copy that. Much as I'd like to sit here and talk about the landing site, Deke's here looking over my shoulder and he's telling us we've got to get on with this flight plan update.

ORION Okay, let me get Charlie on comm, I want him to hear it too.

CAPCOM Roger.

ORION Okay, we're ready, go ahead.

CAPCOM Okay, your surface checklist page 5-7.

ORION Go.

CAPCOM Okay, a change. Stow hammocks, roll up with sleep restraints. 2, that's in the right hand column about 3 or 4 lines down. Change of 2 - stow hammocks and sleep restraints in jett bag.

ORION We could probably have figured that out. Go ahead.

CAPCOM Okay, I'm sure you could have. Okay, on that same column at the bottom of the page says liftoff time data and book for a rev 37 to 43, we'll change that to 46 to 51.

ORION 46 to 51.

CAPCOM Okay, and on the - right under that on the pro verb 37 06 enter, we'd like to delete both of those lines.

ORION They're deleted.

CAPCOM Okay, on page 5-8 on the left hand column says empty ETB as follows, we'd like to delete 1-8CX mag B and LPG compartment.

ORION That's deleted.

CAPCOM Okay, and after stowing ETB at the top of the next column we'd like to add 1-8CX mag D.

ORION Okay, 1-8CX magazine D.

CAPCOM Okay, that's D as in Delta. And then in that same column down it says 2-16 mags R and S, we'd like to change that to 1-16 mags S.

ORION Okay, 1 mag S.

CAPCOM Okay, that's S as in Sugar. Okay, on 5-9 left hand column near the bottom of the page it says stow ICG and ICG bag. We'd like to change that to stow ICG (empty

CAPCOM pockets) in jett bag.
ORION Okay.
CAPCOM Okay, and at the bottom of the page after
the used food in container, we'd like to add 2 lines. The
first 1 is LCG adapters and the second line is urine receptacles.
ORION Okay, LCG adapter 2 and urine receptacle 1.
CAPCOM Okay. On 5-10 delete all of the page and
add battery management at 164 plus 45 in the right hand column.
ORION Okay, battery management at 164 hours and
45 minutes.
CAPCOM Okay, I'll send up the stuff for your
Q cards later, we'll go on to page 7-1. And I'd like to know
if you'd like the change in times in the surface checklist,
that's what some of these changes are.
ORION Not particularly.
CAPCOM Okay, I won't send those then. Okay, we'll
have to go on to 7-5 then.
ORION Okay, we're at 7-5.
CAPCOM Fine. Okay, on 7-5 delete battery manage-
ment, on-Houston cue, telemetry PCM low, S-band voice and
down voice backup. We'd like to delete all of that.
ORION Okay, that's all done.
CAPCOM Okay, and after B-SLSS rock bag against
hatch add report PRD reading to Houston.
ORION Okay, report (garble) to Houston.
CAPCOM Okay, on 7-5 and 6 delete all of the doff
suits.
ORION Okay, go ahead.
CAPCOM Okay, on 7-6 delete EVA debriefing with
Houston and delete eat period right after it.
ORION Okay, go ahead.
CAPCOM And change 158 22 presleep and equipment
stowage to 172 plus 32 equipment stowage and that's 27 minutes.
ORION Okay, go ahead.
CAPCOM After equipment stowage 27 minutes add
circuit breaker panel 11 heaters AOT closed. That would be
right below the solar wind minus A.
ORION Before the -
CAPCOM Okay, and we'd like to - I'll hold.

END OF TAPE

CAPCOM Ready?
DUKE Okay. Then what?
CAPCOM Okay. On the Stow, the ETB against the hatch. And the next line, change to Stow ETB in IFA big pocket.
DUKE Okay. Stow ETB in IFA, big pocket.
CAPCOM Okay. On Page 7-7, delete everything except the first three lines in the left-hand column.
DUKE Understand, delete everything on Page 7-7 but the first three lines.
CAPCOM That's right. And Page 7-8, delete the whole page.
DUKE That's done.
CAPCOM Okay. On Page 7-9, we'd like to add at the left top side "Rendezvous Radar Operate Close, Rendezvous Radar Standby Open, Circuit Breaker Panel 11 LGC/DSKY Close, Circuit Breaker Panel 11 Mission Timer Close."
DUKE Okay. Go ahead.
CAPCOM Okay. After the Gimbal Lock Light Off, about halfway down the page, write in "Delay Verb 16 Noun 65 Enter, Mission Timer Up" - Correction: "Mission Timer Check until after uplinks".
DUKE Okay. Go ahead.
CAPCOM Okay, on 7-9 still. After Verb 21, now 27 Enter 0 Enter, add "Wait for Go Ahead from MSFN".
CAPCOM Okay. For some information here, you might note that this is about the time we'll be getting the 210 and we'll be able to watch the power-up.
DUKE Okay. But we always wait for a go ahead from MSFN on the E Memory dump.
CAPCOM Right. That's correct. But we're adding it here anyway. Okay.
DUKE Okay.
CAPCOM On the Telemetry High Verify, the telemetry will be in Low, so we'll add "Telemetry High and Voice to Voice".
DUKE Okay.
CAPCOM Okay. And we'd like to change the uplinks to "Lift-Off Time Update, Timr Inclement Update, RLS and CSM State Vector".
DUKE Okay. Understand MSFN will uplink the Lift-Off Time Update, Time Increment Update, the CSM State Vector and RLS.
CAPCOM Okay. Good.
CAPCOM After Updata Link Off, add - that's at the bottom of the page, "Verb 05 Noun 01 Enter, 1706 Enter,

CAPCOM and Verify TFM.
 DUKE Okay. What is it supposed to be?
 CAPCOM We'll give you a call on that.
 DUKE Okay, is it the same as it was in the
 activation checklist?
 CAPCOM Negative on that. You should see it in
 the DSKY.
 DUKE I wouldn't think it would be. Yeah.
 CAPCOM Okay. On the top of the right-hand column,
 add "Circuit Breaker Panel 16 Inverter 2 Close, and Inverter 2".
 DUKE Okay. Circuit Breaker 16 Inverter 2
 Close, Select Inverter 2. Go ahead.
 CAPCOM Okay. And that Power Amplifier Primary,
 change that to Secondary. And change, in the next line,
 Telemetry High to Low. And delete Voice to Voice.
 DUKE Okay. Its Power Amplifier to Secondary,
 Telemetry to Low and delete Voice to Voice.
 CAPCOM Okay, on the bottom of the page, delete
 the P22 Acquired Time. And change Lift-Off time to -
 DUKE That's deleted.
 CAPCOM Right. Change Lift-Off time to 175 plus 44.
 DUKE A hundred and seventy-five, forty-four.
 CAPCOM Okay, on 7-10 -
 DUKE Okay. Go ahead.
 CAPCOM On the A/T three star - Correction: delete
 the box with the A/T three star. And on the next line, there,
 it says -
 DUKE Okay.
 CAPCOM On the right-hand column, it says Noun
 25 00014 Pro-Align Complete. Change that to "Noun 25 00014
 Enter 00 Enter".
 DUKE Okay. 0014 Enter 00 Enter. Go to P00
 CAPCOM Okay, fine. And delete the star marks
 procedures
 DUKE Okay.
 CAPCOM And on parking the rendezvous radar antenna,
 we'd like to change that to trunnion 0, shaft030.00.
 DUKE Okay. Change it to trunnion 0, shaft
 030.00.
 CAPCOM That's affirmative. On Page 7-11, change
 the time 168 plus 10 to 173 plus 29 and delete the rest of
 the page.
 DUKE Okay. That's done.
 CAPCOM Okay. On Page 7-12, delete everything
 except the VHF Voice Check on the left and the Ascent PADS
 Update at the bottom.

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DUKE Okay. The V 22 is out.

CAPCOM Okay. On Page 7-13, delete. And Page
7-14, delete.

DUKE Okay. That's completed.

CAPCOM Okay. On 7-15, delete the left-hand column.
On the right-hand column, change 170 plus 15 to 174 plus 14.

DUKE Okay. Go ahead.

CAPCOM And right under that line, we'd like to
add "Stow Purse in IFA Bottom Pocket".

END OF TAPE

CAPCOM Stow purse in ISA bottom pocket. And right under that, stow ISA on the aft engine cover.

ORION Okay, stow purse in ISA which pocket?

CAPCOM The bottom pocket.

ORION Okay, stow purse in ISA bottom pocket, stow ISA on the aft engine cover.

CAPCOM Okay on page 8-1. Change the time 170 plus 30 to 174 plus 29.

ORION Okay, go ahead.

CAPCOM Okay on 8-2, top line, 3rd from the left, open S-band antenna. 8-3 --

ORION Okay, go.

CAPCOM 3rd line. 7 from the left, open S-band antenna. And on the 4th line, again open S-band antenna about right under it.

ORION Okay. Open AGS band antenna, open the S-band antenna and the comm and the S-band antenna heater.

CAPCOM Okay on 8 -, correction 8-5, on the AGS column, change 373 (plus 010502) to plus 03440.

ORION Okay plus 03440.

CAPCOM That's correct. On 8-6, change the time 170 plus 50 to 174 plus 49. And delete

ORION Okay go ahead.

CAPCOM the steerable antenna pitch and yaw procedures. And right under that change the 170 plus 55 to 174 plus 54.

ORION Okay.

CAPCOM On 8-7 change 171 plus 00 to 174 plus 59.

ORION Okay.

CAPCOM On 8-9, change 171 plus 10 to 175 plus 09. And change the program 12 tig to 175 plus 44.

ORION Okay.

CAPCOM On page 8-10, change the time 171 plus 15 to 175 plus 14.

ORION Okay.

CAPCOM On page 8-12, change the time 171 plus 28 to 175 plus 27.

ORION Understand 175 plus 27.

CAPCOM That's correct. On 8-13. 171 plus 30 to 175 plus 29.

ORION Okay, 175 plus 29.

CAPCOM Right, on page 8-14, row 1, open S-band antenna.

ORION Okay.

CAPCOM Okay, on 8-15, row 3, open S-band antenna also on row 4.

ORION I got you.

CAPCOM On 8-16, change the time 171 plus 33 to 175 plus 32. Change the time 171 plus 35 to 175 plus 34. And

CAPCOM at the bottom change 171 plus 40 -
ORION 175 plus 34.
CAPCOM To 175 plus 39. And I copied yours.
ORION Okay, 175 39.
CAPCOM Okay, and we'd like to go to your EVA 3
cue card. Okay John, we're going to hold that cue card. We'll
pick it up first thing in the morning. I've given you alot of
stuff here.
ORION Ah, we're ready to copy. It ain't so much
Tony. You're not doing anything but changing -- changing so
we can liftoff without throwing everything out.
CAPCOM Right. Okay, on the EVA prep.
ORION Okay.
CAPCOM Add the PLSS comm check after comm on the
3rd column. S-band mode PM, transmitter/receiver secondary
power amp secondary, voice down voice backup, PCM PCM and
range off.
ORION Okay, we copy that Tony. Go to PM,
secondary secondary down voice backup, PCM and off.
CAPCOM Very good. And the telemetry biomed, we'll
go to right on that instead of off. And change recorder on to
recorder off.
ORION Okay. Telemetry biomed is right and scratch
recorder.
CAPCOM Rog. Okay and the -- on the EVA 3 post-
card prep for equipment jet 1, change 31 percent to 22 percent.
ORION Standby 1.
CAPCOM Okay, it's on the backhand -- backside
bottom half, left hand column up about an inch from the bottom.
ORION Yeah, I see it. Okay, 22.
CAPCOM Right. And change remove ISS, it's right
under that; remove ISS rap and tie to stow in jet bag.
ORION Okay.
CAPCOM After Yo-Yo's 2, add ISS and helmet bag.
ORION Okay, ISS and helmet bag.
CAPCOM Okay, and on up in the next column at the
top under cabin repress, delete comm uplink squelch off.
ORION Okay, that's 3rd column, 2 lines from the
bottom.
CAPCOM Right, that's correct. 3rd column, 2 lines
from the bottom. Okay, and that's it.
ORION Okay.
CAPCOM And we have some questions on the OPS
antenna.
ORION I was afraid you would.
CAPCOM Oh, sorry John. They keep trying in front
of me.
ORION Okay.
CAPCOM Okay, on the broken CDR's OPS antenna, we'd
like you to 1, remove any of the sharp edges with the scissors

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CAPCOM and examine the entire length of the antenna
for cracks. And we'll give you time to dig that out

END OF TAPE

ORION (garble)
CAPCOM Yeah. We'll give you time to dig that out.

ORION Okay. The reason that it's broken is on account I climbed in here with it open, because we we're being rushed toward the end.

CAPCOM Rog. John. You're exactly right. I'm sorry but I shouldn't let you get so far behind.

ORION Well, that's all right. No problem. We had plenty consumables and where's the fire?

CAPCOM Okay. What we'd like you to do is reasonable, as best as you can, patch work job on that antenna. We saw about a 15 DB LOSS from you when it broke. And we'll probably ask you and Charlie to switch OPPTS tomorrow because you're relaying.

CAPCOM All right we'll give you some words on that in the morning. But, if you see any cracks, we'd like you to tape around the antenna about three loops it says, such that covers a crack of about a half inch on either side.

ORION Three loops - - three loops of tape?

CAPCOM Rog.

ORION Okay. Tony, ah - the antenna is as about as long as the - about a half inch longer than the pin likes we carry and it's in good shape, except for a little crack at the top where it broke off.

CAPCOM Okay. That crack on the end there, we just like you to trim that back.

CAPCOM And, examine the thing down where it goes into the connector there and make sure it isn't cracked down there.

ORION Okay. We all ready did that and it's not cracked down there.

CAPCOM OKAY.

ORION It's right up at the end.

CAPCOM Roger.

ORION And Charlie's got three loops of tape around it.

CAPCOM Okay. As far as we're concerned, the government's going to allow you to sleep. We'd like you to go into your presleep now and we expect a LiOH change and we understand your going to call your PRD readings before you go to bed.

ORION First we've heard about it, but we'll do it, I guess.

ORION Tony, could we beg off on a PRD read - -

CAPCOM Rog. My error PRD's in the morning.
Sorry John.

ORION Okay. We got the (garble) pile one on top of the other and it'll be a mess if the bags are up around

ORION the legs it'll be a mess to dig them
out of there.
CAPCOM Rog. Don't mess with it.
CAPCOM Rog. Deke's standing here and he said you all
did a beautiful day's work and he's anxious to see you all
hit the sack ASAP.
ORION Okay.
CAPCOM And, I sure agree on that beautiful
day's work -
ORION Where's this MCC Houston - Where's this
MCCH conference at?
CAPCOM It's just over. You just had it.
ORION Oh, I thought maybe you guys were going
to the Wheel or something.
CAPCOM (Chuckle) You mean you didn't enjoy it?
ORION I would interested what our EVA is going
to look like for tomorrow.
ORION Maybe I was off comm when you told Charlie
or something.
CAPCOM No. We haven't said anything about it.
The planners will be back working on it. But I can tell you
what it looked like before EVA 2. There was a 5-hour EVA
with about an hour upon North Ray and about 20 minutes at
Station 13 and essentially the rest of the time back in the
LM ALSEP area, especially east of the LM there.
ORION Okay. It's probably subject to a change.
Huh.
CAPCOM It probably is. You got a lot of good
data today and that'll make them think about it over night
anyway. But I'm sure everybody's sort of drooling about
North Ray.
ORION Yeah. I kind of feel like if we're
ever going to be able to sort this out North Ray's probably
the place. Personally to be able to get down 200 meters is
something we probably ought to do to see just how complicated
this thing really is.
CAPCOM Rog. Your right. Let's not thing
geology, let's go to bed. Incidentally we'd like to go low bit
rate down where's it back up, I guess with a 210 we can't assure
being hooked up.
ORION Okay The low bit rate down where's it
backup. You got it.
CAPCOM Okay.
ORION Okay. Tony whose the (garble) show you
want to look at tonight.
CAPCOM Okay.biomed left.
ORION Yea.
PAO This is Apollo Control - -
ORION We just put in a strong vote for North
Ray. It looks sensible and there's a tremendous block up

ORION we'd like to look at.

CAPCOM Okay. We heard you talking about that. I vote for it too. I'm going to go back and talk to them before I go home. We'll see you all in the morning. Good night.

ORION Okay. Take it easy Tony. Thank you now. That was a good day's work for yourself.

ORION Hey Tony, one final comment. We've been talking about that crater that we took a pan of as we spun around and (garble) looked like (garble). John and I are leaning towards (garble) on that and hopefully from the films that we got that you might be able to sort them out.

CAPCOM Okay. We'll sure take that into consideration. I don't know whether it'll effect tomorrow, but I think it's a good observation. We'll see you.

CAPCOM And, Charlie, we still have a high bit rate. We'd like to get a low.

ORION A low bit rate.

ORION And Charlie, (garble) right now.

CAPCOM Okay.

PAO This is Apollo Control, Houston, at 154 hours 36 minutes ground elapsed time. That was a sign off for this evening with the crew of Orion. Now getting ready to get some sleep, the gentleman named Deke that was referenced in the conversation is Donald J. Slayton, the Director of Flight Operations, who has been in the Control Center during this conference, and obviously anxious for the crew of Orion to get a good night's sleep. We're at 154 hours and 37 minutes ground elapsed time and at this point we'll take the line down, but bring it up if further conversations should develop. This is Apollo Control, Houston.

END OF TAPE

PAO This is Apollo Control Houston at 155 hours 3 minutes ground elapsed time. We've had some conversation with the crew aboard Orion since we had taken the line down. We'll play that conversation for you now.

DUKE Houston, 16. Over.

CAPCOM Yeah.

DUKE Hello, Houston. Houston Orion. Over.

DUKE Houston, Orion. If you're reading B you have a lot of static on the uplink. Over.

CAPCOM Okay. Percy precision, sorry about that and we have the uplink turned down. Now I guess somebody did you hear us comment?

DUKE Somebody was blasting about a cockpit, I turned the squelch off but now it - - who is that talking, is that Stu.

CAPCOM Yeah, Charley. Boy you're sure looking good up there.

YOUNG hHey, babe, how you're doing. Nice to talk to you.

CAPCOM Yeah.

DUKE Hey, you were right, I could spend my whole life up here. Really a thrill - really great.

CAPCOM Oh, man, you're really swinging.

CAPCOM Okay. Charley we'll do something about that uplink. We're working maybe the switch configuration now.

DUKE Okay, this is beautiful right now Stu.

CAPCOM would there er be an old saying that would apply to that then wouldn't it.

DUKE That's right.

CAPCOM Hey, Charley could we have you check your uplinks squelch, is that off?

DUKE Yes, off right now.

CAPCOM Okay. Charley we're going to kill the uplink and I'll be standing by if you hear the noise give us a call back. Have a good nights rest boy, we'll have a cool one for you.

DUKE That sounds good. Hey, we haven't gotten to the pre-sleep checklist part. If it calls for squelch enable I can turn it on and we'll be okay.

CAPCOM Okay, Charley. Looks like we wanted you to go to sleep a little early and we got ahead of you. If you call us - - just when you finish the pre-sleep checklist and at that time we'll have the right configuration.

DUKE Okay, Houston. Since we only got a watch on Houston time could you give us a time - - what time we're suppose to be up in the morning.

CAPCOM Okay. Stand by. Okay. Charley you were going to wake up 8 hours from now until around 10:35 if we

APOLLO 16 MISSION COMMENTARY 4/22/72 CST 2245 GET 155:03 MC-593/2

CAPCOM enter a call around 6:35 in the morning.
DUKE Okay, but we'er about a half hour awake
from being asleep. We still going to get up at 8:35, right.
6:35.

CAPCOM Okay, John. We'll give you a call at 7
o'clock.

YOUNG Okay. Hey, with only the understanding
that that doesn't take a half hour off on EVA, uh.

CAPCOM Okay. The flight say that they got all those
good uplink changes to you this evening everything looks
real clean. And he feels that he can get into the EVA on time.

YOUNG Okay.

PAO This is Apollo Control Houston at 155 hours
8 minutes. That was Stu Roosa speaking from the Control Center
here. He is working as CAPCOM with Ken Mattingly in the command
module. Tony England with the crew of Orion now in their rest
period has left the console. We're at 155 hours 8 minutes.
This is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control Houston at 155 hours 25 minutes. We're comming up on acquisition with CASPER in less than 1 minute, approximately. We'll open our line to air ground 2 and monitor for conversations that may very well take place between CAPCOM Stew Roosa here in Mission Control and Ken Mattingly aboard CASPER. Mattingly is not scheduled to start his sleep period until about midway through this front side pass on the 42nd revolution around the Moon. We're at 155 hours 26 minutes. This is Apollo Control Houston standing by. We're now acquiring telemetry data on CASPER.

CAPCOM CASPER, Houston standing by.

CASPER Hello there.

CAPCOM Greetings. Well, how did old coal shooter look Ken?

CASPER Like a big mountain.

CAPCOM Ah so.

CASPER This is one of these things where that strip was planned for the ground track post plane change and of course we were further south at the time than was intended, so it didn't very well -- was really scruntched up in the corner. I don't know whether that's really going to be any help or not but -- try it and maybe it will come out okay.

CAPCOM There can't be any bad pictures of the Moon.

CASPER That's right. When you got nothing, a little goes a long ways.

CAPCOM Okay, we're about to wind it down Ken. Only 2 things have for you is to go over these rendezvous procedures and let you get on through your pre-sleep checklist and wipe it out for the day.

CASPER Sounds like a good plan. Why don't we go through your -- your little plan first.

CAPCOM Okay, if you're ready we can go over to 171 40 and you'll have your procedures there.

CASPER Okay, 100 and let's -- 140 -- let's see, before I get over there, you want me -- oh you'll remind me to come back to that shift the deadband. Okay. Okay, I'm at 171 40.

CAPCOM Okay, and in that space in between that update and the LM liftoff is a nice place to write -- let's put in there first; optics mode CMC verify, underneath that, let's write a note. Spacecraft control must be in SCS prior to optics mode manual. I'm just reminding you of the note that we passed on the other night Ken.

CASPER That's just fine.

CAPCOM Okay, and then come on down after LM liftoff and where you have P34, delete the CMC mode hold and delete the next line set NOUN 79 et cetera. Okay, and we'd like to add in here, that will be 4 lines, so you might start out kind of small; spacecraft control SCS, B-mag mode (3) at 1 rate 2.

APOLLO 16 MISSION COMMENTARY 4-22-72 GET 155:24 CST 23:06 MC-594/2

CAPCOM All rightie. And then the next line, attitude deadband, max rate low and limit cycle on. That's all on that page.

CASPER Okay. Let me read that back to you then. Between the update and liftoff, I've got optics mode to CMC verify and the notes (garble) spacecraft control must be in SCS prior to optics mode going to manual. Liftoff --

END OF TAPE

CASPER the spacecraft control must be in SCS prior to optics mode going to manual. Following liftoff next to the VERB 88 spacecraft control on SCS B MAG mode 3, at 1 rate 2, deadband MAX limit cycle on and rate low.

CAPCOM Okay, that's affirmative.

CAPCOM Okay, go to the next page Ken.

CASPER All set.

CAPCOM Okay, down here at 172 10 delete CMC mode auto.

CASPER Okay.

CAPCOM Okay. Now Ken, this is just a couple of words on dealers choice. Now as you recall from running this in your attitude right here at about 172 13 your trunnion is down through about 22° and of course there you'll go on auto. Now they tell me the way you had been flying the SCS rendezvous that you'd just stay in at hold let the trunnion. If you want to here you could put the pitch B MAG to rate 2 and just bang it once. But I'm not gonna give you any changes of flight plan of that. That's just your option on how you want to keep the trunnion angle.

CASPER Okay, I'll write a note here to watch for that at that point.

CAPCOM Yeah, your trunnion will be - if your right on nominal - will be 22° right around - oh somewhere in the order of 172 12. Okay, and then down at the bottom there prior to - or in between the MSFN disables and the P34 final comp I want you to write in optics mode CMC and this is just a reminder.

CASPER Okay, between MSFN disables and final comp we'll write in optics mode to CMC. I've added the note at the top that this is 172 10, to watch for trunnion increasing greater than 22 and B MAG, at least the pitch one can go to rate and give it blip.

CAPCOM Okay, that's just one way of doing it and it works real good and it does not take a large rate in there, just - just about 1 or 2 at the most of what would be a minimum impulse fire.

CASPER Okay, the only reason I had been using at hold before was because we were simulating a loss of of the IMU and in that case I wanted to use the attitude gyros because they had less drift. And it made the marking simpler, but in this case I might as well let it - give it a burp and let it track along.

CAPCOM Okay, that's the way I ran them and the line of sight rates are pretty low and it's just sort of one of these no sweat things. Just about 1 fast blip and then it just hangs right there.

CASPER Very good.

CAPCOM Okay, and you've got your optics mode CMC down here toward the bottom. We'll turn the page.

CASPER Alright, I'm with you.

CAPCOM Okay, now Ken here's - this gets kinda messy through here so you might try to write small and only thing we're trying to do is, of course, get into P40 and take the auto maneuver, set up for the SCS burn, get back into track attitude and then back to SCS and the way we'll do that is we'll take the first line - cycle CMC mode pre auto and delete it.

CASPER Okay.

CAPCOM Okay, and then after P40 write spacecraft control CMC and next line B MAG mode (garble) 3, rate 2. And I want to make a note here, Ken, this is not for you to write down now, unless you want to, but you'll be tracking along here and you might be a little out of the preferred track attitude and if you go into spacecraft control to CMC before you get to the burn program, the CMC will try to take you back to the preferred attitude and you're just wasting an RCS maneuver so wait until after you're in the burn program to go to CMC and that's true also of P41 for the midcourses.

CASPER Okay, that's a good note.

CAPCOM Okay, and down here where it says SPS checklist, we're deleting that only because you're SPS Q card is - is marked up so bad and so the reason why - let's at least say you don't use the Q card as written which you wouldn't but we just want to make that point and in the space in there between compare solution in PPI, I've got 3 lines for you. The first one is spacecraft control SCS after auto maneuver. The next line is, and here again this is sort of superfluous but it's B MAG mode 3 at 12

END OF TAPE

CAPCOM The next line is - and here again, this is sort of superfluous, but it's B Mag Mode 3 at 1 Rate 2. And then, just to sum it all up, could we add a note "Use SCS Burn Procedures if Required". And here again, this is not for you to write down unless you want to, Ken. It's a personal reminder that we talked about before that if you Enter on that 204 Display before going to SCS you have activated the Relay.

MATTINGLY Okay. I think I will just put another little note out here.

CAPCOM Okay.

MATTINGLY Okay. If I am in SCS Control, though, I can afford to do an Enter on 204?

CAPCOM That's affirmative. If you're in SCS Control, you have no power to that Relay. It comes through the Spacecraft Control Switch, and -

MATTINGLY Okay. That was my impression.

CAPCOM And it must be in CMC, so you cannot get the activation of the Relay as long as you're in SCS.

MATTINGLY Okay.

CAPCOM Alrighty.

MATTINGLY I can still have good navigation through the CMC.

CAPCOM That's affirmative. Uh - you mean - You mean the Navigation Program?

MATTINGLY My onboard state vector in the event that you did a burn.

CAPCOM Oh. What you want to do is to go on into P40 and stay in P40 and then trim your residuals under - out on the G&N.

MATTINGLY Rog. That's what I was - That's what I wanted to get at.

CAPCOM Yeah. And then here's -

MATTINGLY The only thing I have to do is make the actual burn itself under SCS Control.

CAPCOM What we want you to do is be in SCS Control when you respond to that 204 Display and make the burn in SCS. And now, here again, I'm going to bring you up on another little pitfall. You want - down after GPI - You want to wait until the flashing 1685 comes up before you go back to CMC. Now, you know, TPI is a short burn and you could very well burn it SCS on time and have a 99 flashing up there. Go on and get through that and get into your flashing 1685 before you return the Spacecraft Control to C - at least by that is what I'm trying to say, Ken.

MATTINGLY Okay.

CAPCOM Okay. And that summarizes my next line, which just was "Flashing 1685, then Spacecraft Control to CMC" and it was just trying to get across what I just told you in words; and if you made the burn, I'd know your residuals.

MATTINGLY Okay. And if it's all nominal, there really shouldn't be any maneuvering there at all for - to Attitude for the first Midcourse.

CAPCOM That's affirmative. It's generally not. And the way the Procedures show it, if you want to be technically correct is, prior to P35, reminding you of your B Mags again - B Mag Mode 3 to Rate 2. Then go ahead into P35 and - generally I don't come up with a greater than 10 degree maneuver, but sometimes it dresses up the preferred track, there. So -

MATTINGLY Rog.

CAPCOM Okay. Then after P35 we have B Mag Mode 3 at 1 Rate 2 after Maneuver.

MATTINGLY Okay.

CAPCOM Okay. Attitude Deadband Max is the next line. And the next line after that is Spacecraft Control to SCS. And if you want to, write you down a little note beside that before Optics Manual.

MATTINGLY Okay.

CAPCOM And Standby 1 - Uh, that's okay, Ken. Okay, let's come on down here to P35 and delete Cycle CMC Mode 3 to Idle.

MATTINGLY Okay.

CAPCOM Okay. And let's - Just before that P35 final comp, just because it's an easy place to write it, let's put it down Optics Mode CMC.

MATTINGLY Okay. Got that.

CAPCOM Okay. Then, after P41 -

END OF TAPE

CAPCOM (garble) optics mode CMC.
 CASPER Okay, got that.
 CAPCOM Okay, then after P41, we'll put spacecraft control CMC and now here Ken, since it -- we never take the maneuver but just to cover all cases on that -- on the P41, after spacecraft control CMC, we can put down B-mag mode 3 rate 2, since we are running a little out of configuration.
 CASPER Okay.
 CAPCOM Okay then Ken, after -- after the midcourse 1 through P76, P35 and we're just about through with these. We'll have B-mag mode 3 at one rate 2 after maneuver and the next line is spacecraft control SCS before optics manual. And that takes care of that page.
 CASPER Okay.
 CAPCOM Alright, if you want to turn the page. We're just about home. Right before the P35 final comp, we'll put optics mode CMC. And after the P35 final comp, we'll delete the line cycle CMC mode free auto and then after P41, spacecraft control CMC, and our last entry then, B-mag mode 3 rate 2. And that was a lot of talking Ken but that will keep the B-mag where they're suppose to be and the relay where it's suppose to be.
 CASPER And it was all worth it. Okay suppose -- suppose I read that all back to you.
 CAPCOM Okay.
 CASPER Okay, we already covered the --
 CAPCOM Ken about
 CASPER And I'll go to attitude, yes, go ahead.
 CAPCOM Okay, could we interrupt here before your readback and we've got your jet on monitor loads but -- standby one. Yeah, what we'd like for you to do is go to the 2 and a half degree deadband as that change that we had and then they can be uplinking while you're reading back.
 CASPER Okay, I'll do that in just a second here. Okay, we're in the 2 and a half degree deadband and you've got ACCEPT.
 CAPCOM Okay, jolly good and I'm ready for the read-back.
 CASPER Okay, let me mark off what I did here. Okay, before liftoff, we'll end up with making sure the CMC has control of the optics, we'll fly with the CMC until the initial attitude, then we'll go to SCS control, B-mags 3 at 1 rate 2. Max deadband limit cycle on and rate low. Then we'll do our initial tracking there and we'll stay with that and at 172 10 when the normal auto maneuvers would be enabled, I'll probably take the pitch B-mag to rates and start a small rate in there.
 CAPCOM Yeah, that'll be just one small blip.
 CASPER Rog. Okay, and just before the final comp on P34, we put the optics mode to CMC. Let the P34 finish and

CASPER once I'm in P40 I give the spacecraft control to CMC, B-mags 3 to rate 2 and accept the maneuver. When I'm in attitude, I can go back and do SCS control, B-mags 3 at 1 rate 2 and should a burn be required, I'll make an SCS auto burn. I'll null the G&N residuals, still remaining in SCS control. I'll proceed past the NOUN 85 before returning control to G&N. And it'll be B-mags 3 to rate 2 when I get-- I think the safest place is when I get in -- all the way into P35. When I get there, I'll return spacecraft control to CMC and take the maneuver. Go back to SCS control B-mags at 1 rate 2, all 3. Deadband max, then I'll take spacecraft control SPS and then optics to manual. Prior to the final comp we go optics mode to CMC. Again, at P41, we'll hold spacecraft control to CMC and I'll be bypassing the maneuver. And I-- if we take the maneuver, it's B-mags 3 rate 2, again we'll proceed all the way through it and when I get into P35, I'll take the B-mags back to add 1 rate 2, again spacecraft control to SCS. Then optics to manual. Same procedure for midcourse 2, except that at the completion of midcourse 2, why I'll just stay in SCS, -- I mean CMC.

CAPCOM Okay Ken. Couple of comments there, now I guess how you trim the residuals is sort of dealers choice. Once you're in that flashing 1685 display, why you can go to CMC freely, so you can play that any way you want.

CASPER Okay, but I might just as well stay in SCS. That's a simpler -- and one less number that I'm likely to confuse.

CAPCOM Okay, now let me -- and your readback was okay. There is something that I'll say, after the P35 where you have B-mag mode 3 at 1 rate 2; okay, if the CMC starts you on a good track rate, I just didn't want to get the procedures too clouded up, but you know if you put your pitch B-mag to rate 2 there, before you go to SCS you'll keep in your CMC track, now you'll be below the rate in which you're maneuvering but you -- between TPI and midcourse 1 you'll exceed your attitude deadband. So since you did say you were going to go on the track method. People talked me out of when they said you always did the other one that I think you should put a note in there, B-mag roll and yaw -- that 1 rate 2 and pitch B-mag 2 -- I mean roll and yaw at one rate 2

END OF TAPE

CAPCOM CMC track. Now you'll be below the rate at which your maneuvering but between TPI and mid-course 1 you'll exceed your attitude deadband. So you did say you were going on the track method. People talked me out of that when they said you always did the other one. I think you should put a note in there BMAG roll and yaw. That one rate two and pitch B mag to - - I mean roll and yaw at 1 rate 2 and leave your pitch in rate 2. Did all that talking make sense.

CASPER Okay. That sounds like a good plan. Yes sir I understand you.

CAPCOM Okay. And that would also be true after the other P35.

CASPER Roger.

CAPCOM And just so we make sure that all procedures showing the same - - I'm changing mine to show that Ken.

CASPER Okay. I have my changed to.

CAPCOM Okay. And I think that's it. I've got before the rendezvous we'd give you a swing in the Delta tailoff just for your weight even though you've got a chart, just so you wouldn't have to do any figuring out. Of course 11 is always a good number but just to be professional we'll give you a good one. And since you are making SCS burn.

CASPER Thank you. I was going to ask you for that. It's really not quite the same as if you had SCS holding as you got the information there what's the right thing but it sure helped to be a lot cheaper about your RCS.

CAPCOM Rog. We might as well be professional about this whole show since you're doing such a good job up there.

CASPER Let's see. There's one other thing I was going to ask you.

CAPCOM Yeah.

CASPER About the mapping camera. Are we going to leave it out or we going to try and retract it.

CAPCOM Stand by. Ken, the SIM bay is configured for sleep as of right now.

CASPER Oh, I'm sorry, I - - I'm still thinking about rendezvous.

CAPCOM Oh, I'm sorry. Okay. Stand by. Okay, Ken we're going to retract the camera for rendezvous, extend it again and then we'll retract it for TEI.

CASPER Okay. I guess since we're a little down on the RCS that might be a prudent plan. Looks like we're holding our own if it hadn't been for that practice in formation flying.

CASPER Ken, as far as the flight plan now the new revised version, we're 15 pounds ahead of the flight plan

CAPCOM and we're fad on the rescue red line.
CASPER Okay. That sounds a little bit like changing
the spect's.
CASPER Well you got to be fast on your feet and we'er
a 168 above the rescue red line.
CASPER Okay. I will continue to be miserably.
CASPER By all means and we are minus a 139 on the
other flight plan.
CASPER Rog.
Capcom Okay. And I guess that takes care of our
rendezvous procedures. And sounds like you got them all copied
in good order and feel certain that'll go real easy for you.
It's a smooth procedure even though it takes a lot of talking.
And I guess I might remind you about your waste storage vent
valve at this time if you haven't already got it.
CASPER I've already turned it off Stuart.
CASPER Okay. I thought maybe if I talked to you
long enough you might miss that but I didn't catch you.
CASPER Okay. Well I think I'm going to configure
myself to sleep.
CASPER Okay. That's all we have and we'll - - I
guess we got maybe a couple of things there on the onboard
readouts and after that it'll be - - we're through.
CASPER Okay. Let me give you those little guys
right now. Start with the RCS, QUAD A, 61 percent, QUAD BRAVO
59, Charley 66, Delta 67, battery C is 36.5, pyro battery - -

END OF TAPE

CASPER Quad A, 61%; Quad Bravo, 59; Charlie, 66; Delta, 67. Battery C is 36.5. (Garble) Battery A is 36.7; Battery B is 36.7.

CAPCOM Okay. We have got all of those, and the computer is yours. You can go back to Block.

CASPER Okay. And, let's see. Did you start the - Yes, you've got my monitor running. Thank you, sir.

CAPCOM We aim to please.

CASPER You guys do that.

CAPCOM Okay, I'm going to hush and leave you with the Flight Plan and let you get some rest; and, tomorrow's going to be a big day. And, we'll see you around.

CASPER Okay, Stu. Thanks a lot. Good night.

CAPCOM Rog.

PAO This is Apollo Control Houston at 156 hours 03 minutes ground elapsed time. The long exchange between Capcom's Stu Roosa and Ken Mattingly was principally involved with Flight Plan updates for tomorrow's rendezvous and docking. Mattingly now readying himself for the - for a night's sleep prior to rejoining his fellow crewmembers tomorrow. We're at 156 hours and 03 minutes. This is Apollo Control Houston.

END OF TAPE

CASPER Stu, would you folks like to have an
E memory dump?
CAPCOM Could you stand by 1 for us Ken?
CASPER Sure thing.
CAPCOM Okay, Ken, we're ready for the E memory
dump, and big brother is looking over your shoulder we
notice you're in SCS control -
CASPER Thank you big brother.
CAPCOM And CASPER, Houston.
CASPER Go ahead.
CAPCOM Okay, somebody has moved the specular
point on us, Ken and we'd like to verify the VHF in the
right antenna and if it is we'd like to go to the left
antenna for 3 minutes. And you give me a mark and I'll
give you a call.
CASPER Okay, it is in the right. I'm going
to move it to the left. Stand by. Mark. It's in the left.
CAPCOM Okay, understand left.
CASPER I can't imagine who'd do something like
move something like that.
CAPCOM You know, it's getting where you can't
trust anybody these days, not even Newton.
PAO This is Apollo Control Houston at 156
hours 13 minutes ground elapsed time. In the mission
control center we're in the process of having a shift change
over. Gerry Griffin, whose team of gold flight controllers
now taking over - Griffin's team of gold flight controllers
are now taking over from Gene Kranz's white team of flight
controllers. There will be no change of shift briefing or
news conference following this change over. We're at 156
hours 14 minutes ground elapsed time and this is Apollo
Control Houston.
CAPCOM Okay, CASPER, if you'd give us VHF
right antenna and we are going to leave it in right antenna.
CASPER Okay.

END OF TAPE

PAO This is Apollo Control, 157:12 minutes into the mission of Apollo 16. All three crewmen aboard both, Casper and Orion, tucked in for the night, on what should be about 8 hours sleep period on both spacecraft, for both sets of crews. Ken Mattingly signed off during the 42nd Lunar Rev and he and Casper are some 10 minutes away from acquisition of signal coming around on Lunar Orbit number 43. Gold Team of Flight Controllers came on at midnight central time here at control center, and are fine tuning the flight plan items; sorting out systems status and so on for the Lunar Module, for the EVA 3 to take place today at 157:14 this is Apollo Control.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 01:55 GET 158:12 MC-602/1

PAO This is Apollo Control, 158 hours and 12 minutes ground elapsed time. Command Service Module Casper, more than midway across the front - face of the Moon in revolution number 43, 23 minutes away from Loss of Signal. Meanwhile, Young and Duke are still asleep at Descartes Landing Site. The Apollo Lunar Surface Experiment Package that has been erected at Descartes Landing Site by Young and Duke continues to operate normally at this time. 149 commands have been uplinked to the station - scientific station. The input power from the thermoelectric generator is steady at 70.4 Watts. The Passive Seismic Experiment and the Lunar Surface Magnetometer Experiment are both downlinking scientific data, and all of their subsystems are performing satisfactorily. All of the thermal characteristics of the ALSEP equipment are nominal and are following the predicted temperature values. The central station of the ALSEP is showing thermal plate temperatures rising at the expected rate of 4 degrees Fahrenheit per hour. At 158:15 ground elapsed time, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control at 159 hours 12 minutes ground elapsed time. About 4 hours remaining in the sleep period for Duke and Young aboard ORION, in as much as they'll probably sleep about 30 minutes past the normal wake up time - the pre planned wakeup time. CASPER, meanwhile, the command service module is in a 56.2 by 63.5 nautical mile lunar orbit coming up on the front side pass for REV 44 in about 9 minutes. Gold team, flight control team here in mission control watching a playback of the video tape EVA number 2. At any rate those members of the team who were not involved in planning the days activities. That's one way to stay awake. At 159 14 this is Apollo Control.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/22/72 CST 3:55 GET 160:12 MC-604/1

PAO This is Apollo Control 160 hours 12 minutes ground elapsed time into the Mission of Apollo 16. Command Service Module, Casper, nearing the end of the 44th revolution on side pass. Two and a half hours showing in the sleep period clock for Duke and Young aboard Orion. However, likely will run closer to 3 hours before the crews is waked up. Twenty one minutes to Command Service Module LOS rev 44. Rather quite night here in Mission Control. Some of the console positions doing a little homework study for the day's activities, straightening out the accumulation of paperwork, still running the video tape playback of EVA 2, and at 160:14, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control 162 hours 48 minutes ground elapsed time. A little over a minute remaining for the rest period. At Descarte landing site aboard lunar module ORION. About 50 seconds, we've had no indication from the communications engineer that the crew of ORION has turned on their transmitters. Standing by for CAPCOM's call. Peterson's preparing to make his call now.

CAPCOM ORION, Houston.

ORION Who speaks?

CAPCOM Roger, how are you doing this morning?

ORION Super, is it time to get up?

CAPCOM Yes sir.

ORION Okay, reveille, reveille. Hey, we're stirring, we'll be up in a minute.

CAPCOM Okay, ORION, you're stay for EVA 3.

ORION That's mighty nice of ya. And we were looking for reveille for about 7 o'clock, but we'll get going right now.

CAPCOM Roger.

CAPCOM These flight directors are slave drivers.

CAPCOM And ORION, would you give us voice normal, and high bit rate, please?

CAPCOM ORION, Houston, lets go back to low bit rate, please.

ORION Houston, ORION, we have a crew status report for you.

CAPCOM Okay, ORION, go ahead.

ORION Okay, for John, yesterday he had day 7, meal A, and day 7 - stand by - and day 7 meal B. He ate everything on day 7 meal A, he ate everything but the beef steaks, on meal B he ate everything but the Romain soup and the butterscotch pudding. He had no medication and he'd like for the Doctor to guess how much sleep he had to start with and then we'll give you our estimate. For me, we had day - the same two meals, I ate everything on meal A except the bacon squares and on meal B everything but the Romain soup and the butterscotch pudding. I had no medication and I slept for 7 hours. Over.

CAPCOM Roger, and we estimate John slept 6 1/2 to 7 hours.

ORION Okay, he was going to say 7. That's great.

CAPCOM Roger. Okay, why don't you tell him you've got him standing by when he's ready. Okay, and ORION, I've got block data and a note from the surgeon and a battery management procedure at about 164 hours anytime you're ready to copy.

ORION Okay, you can go with the block data.

APOLLO 16, MISSION COMMENTARY, 4-23-72, CST 6:30, GET 162:48 MC 606/2

CAPCOM Okay, the block data starts at 246 with
163 54 55, TPI 166 44 00, T47 165 53 25, 168 42 30, T48
167 51 55 170 41 30, T49 169 50 26 172 40 00, T50 171 48 57
174 -

END OF TAPE

CAPCOM 250 171 48 57 174 39 00, T51, 173 47 29 176
38 00.
ORION Give me number 50 again please.
CAPCOM T50 was 171 48 57, the TPI was 174 39 00.
ORION Okay, I'll just read you back the liftoff
time starting with 46, 163 plus 54 plus 55, 155 plus 53 plus
25 plus 67 plus 51 plus 55, 169 plus 56 plus 26, 171 plus 48
plus 57 and 173 plus 47 plus 29. Over.
CAPCOM Let's verify 249 as 169 50 26. That's so,
Charlie.
ORION Okay.
CAPCOM And the battery management is 164.45
ORION Okay, Pete what time is it now.
CAPCOM 16305.
ORION Okay, Pete on that battery management when
we get to that time just give me a call. Over.
CAPCOM Will do. Okay, and the note from the
flight seorgeon requests that you have the crew check the final
biomed harness for outer suit for EVA. If you have the PRD
readouts handy we'd like them otherwise we'll skip them.
ORION Okay, I'll give you biomed just a second
and John was on all night so guess his is okay. And we'll give
you the PRD's like we always do when we get suited up.
CAPCOM Rog, that's fine, Charlie. And John's
biomed data looked good all night.
ORION Okay. Okay, you're looking at my biomed
now Pete.
CAPCOM Okay. Stand by a minute. Look's good
Charley.
ORION Okay, back to John.
CAPCOM Okay. Both biomed look good.
ORION Okay, Houston, how do you read. Over.
CAPCOM Hear you loud and clear.
ORION Okay. We're going on for the PLSS stop off
right now.
CAPCOM Say again, John.
ORION Okay. Copy PLSS stop off.
CAPCOM Copying off the PLSS's right now.
Orion Roger.
CAPCOM And Orion, we just want to remind you again
that we want put the commanders OPS on the LM PLSS.
ORION Okay. The (garble) OPS.
CAPCOM We didn't copy the question, John.
ORION I say I thought there was something about
a radio transmitter that had to be - - it's a radio transmitter
located out on the PLSS. Is that the answer to that?

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 6:46 GET 163:04 MC-607/2

CAPCOM

That's affirmative John.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 6:56 GET 163:13 MC-608/1

YOUNG Okay, Houston, I'm going on biomed for
about 10 minutes, over.

CAPCOM Okay, John.

END OF TAPE

YOUNG Okay, Houston, how does that biomed look to you now?

CAPCOM Okay. It looks good here, John.

YOUNG Okay, fine.

CAPCOM How are you doing up there?

DUKE Oh, just fine. We finished eating, and we're ready to don suits now.

CAPCOM Okay, fine. Do you want a quick briefing on the traverse today?

DUKE Okay. One comment, Tony, that -- we were talking about last night that we didn't pass on at the feeling we got from all the crystalline rocks was that they had a sugary texture to them.

CAPCOM Okay, we copy that.

CAPCOM We've got the changes for the traverse today are pretty simple. We've got changes to your cuff check list if you want to mark real time and I think we can real time them if that's okay with you. But I'll outline them now. At -- the only change on egress --

YOUNG (garble).

CAPCOM Okay, fine. The only change right after egress, Charlie, instead of putting on Mag L, I'll ask you to put Mag M on the 500 millimeter, that would give you a full mag and that would be all you need. That would save a change up at station 11, and at the LM site there, we'd like you to shoot off some pictures of a pan of Stone Mountain but I'll call you on that when you get out, otherwise, the LM area is nominal. And you go up to Station 11, slash 12, which would be just one station for about an hour and 5 minutes. We're going to drop the near field polarimetry up there, and we'll concentrate on big boulder samples, permanently shadowed sample, and the padded bag sample on the special samples area. We'd still like a stereo pan far field polarimetry of the crater interior we'll try to get about an 80 meter base on that, and when you get up there, Charlie, I'll brief you on what looks the best way to do that. And we'll return along the same route you went up and about a one half to one kilometer off the rim when I talk to you're still on the continuous ejecta blanket, we'll call that station, 13. We'll do a station 13 with the TV and we lengthen it to 15 to 20 minutes. I've got a fixed time here but I don't see right in front of me right now, and that instead of a rock soil will be a rake soil and -- plus a couple of documented samples. And then the rest of the time will be spend back to the LM area. We'll put a -- we'll make a station 10 prime which is about 50 meters west of your station 10. So, it makes a triangle with the deep core which would be south of it and the station 10 which would be

CAPCOM northeast of it and that station 10 prime which makes that northwest corner of the triangle and we'll ask for a rake soil at the station 10 prime at double core at that station, a rake soil at station 10, and then whatever time is left to 35 minutes of dedocumented samples. Now, the end of the EVA is pretty much nominal except John, when you go out to the permanent parking location of the Rover, we'd like you to make sure you take a camera along and we'd do an LTM measurement there after you've parked it, and we'd also ask you to find a dense crystalline rock, if you can find it. If you can't find a crystalline and then at least a dense breccia and we'll do the rock on top of the LTM measurement. That's pretty much it. I'm going to try to keep you to the time line as much as possible because we really got a hard time for getting back in. I know that they won't allow us to go over at all.

YOUNG Okay, well, let me tell you this, Tony. The -- believe it or not, the camera is out in the sun right now part of it --

CAPCOM Is that right? Did the sun come down --

YOUNG The descent handle is out in the sun.

CAPCOM Okay. I guess we'd probably have to slide that back into the shade again.

YOUNG Yeah.

CAPCOM Where do you think it should go? Why don't you just pick a place. I think you're better positioned than the back room. I'm sure you'd have better luck at it.

YOUNG Okay, all I need is to be moved about 3 or 4 inches.

CAPCOM Okay, fine.

CAPCOM And on the LRV, we're going to ask you to go back to the normal configuration of the TWM's. If you have experienced any difficulty, then, we'll go back to the TWM configuration you're in now. And the attitude indicator on that pitch up problem won't cause us any serious problem. Just when you do the NAV-update try to park in a level area, and the back room is hoping that the NAV problem was a temporary one, that'll be okay for EVA-3. Either way, you shouldn't really have any problem cause you can probably see the area you're going to and you're going to go right back along your tracks so we're not too worried about it if you don't have that distance. And we'll projecting hot battery again on EVA-3 and we may have some changes during EVA on that. The mobility rates during EVA-2 were very near those predicted and we have a large margin of battery power so --

END OF TAPE

CAPCOM Also, they mentioned that if you have a dust problem from that missing rear fender, there is a way of putting one of the front fenders on the back, but golly, I don't know whether you really want to do that.

ORION Yes, I don't either, Tony. We'd get the dust from the front then, probably.

CAPCOM Yes, you're probably right. There was a comment from the Apollo 15 crew that the front wheel didn't seem to bother them when they lost a fender up there, that the back wheels seemed to more. I don't understand it, but that's what they said. And that's all I've got if you want to go ahead and get dressed.

ORION Okay.

CAPCOM Incidentally, it's a bright sunny, beautiful Sunday morning here in Houston.

ORION It - like 13 (garble) day, huh?

CAPCOM Right.

CAPCOM Orion, we'd like to go down for a second.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 7:56CST 164:13GET 611/1

PAO This is Apollo Control 164 hours 21 minutes into the mission of Apollo 16. Young and Duke at the present time are donning their pressure suits for the third and final EVA of this mission. Here in the control center the orange team of flight controllers headed up by Flight Director Pete Frank is taking over from Jerry Griffin's gold team and since the previous 8 hour shift with the gold team has been primarily a sleep shift. That is the crew was asleep, there will not be a change of shift press conference. Mattingly has been awake for several minutes, has had some brief exchanges with the spacecraft communicator, Don Peterson, who moved over from the overnight CAPCOM position. Tony England is in now for EVA CAPCOM job. The air ground communications from the CSM will go into transcript in the Houston News room at 164 22 this is Apollo Control.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 8:05 GET 164:23 612/1

ORION Okay, Houston. Orion, over.
CAPCOM Orion, Houston. Go ahead.
ORION Okay, I'm in my suit, Tony, and we'll put John's
suit on.
CAPCOM Okay.
CAPCOM Hey, Charlie. How was it climbing back into
that suit, again.
ORION Well, it feels good once you get it on, but
they sure are filthy.
CAPCOM I'll bet they are.
ORION - they are kind of dirty.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 8:15 CST 164:33 GET 613/1

ORION
management. Okay, Tony, I'm ready for the battery
CAPCOM Okay standby one.
CAPCOM Okay, Charlie, we'd like to read your
ED volts.
DUKE (garble) Houston. That's hanging in
there 37.
CAPCOM Oh that's always good news. And we'd
like the bat one high volt on. The lunar battery off and
the bat two on.
DUKE Okay that's done.
CAPCOM Okay that's it.
DUKE You got that? Okay bat 1, 2, 3, and 4
on. Lunar battery off.
CAPCOM Roger.
DUKE Then our PR (garble). Okay our passive
(garble) are reading 22059 for John and 21123 for me.
CAPCOM Okay we copy.
CAPCOM Okay. And you fellows are doing pretty
good. You're about 10 minutes ahead.
DUKE Okay thank you. Tony this get bag weighs
about 100 pounds.
CAPCOM (garble) just take off faster without it.
CAPCOM Besides that you're going to have to
replace all that with rocks. Incidentally, you have about
123 pounds of rocks, which we can get about another 100 pounds.
YOUNG We do, huh?

END OF TAPE

PAO This is Apollo Control at 165 hours 2 minutes. We've completed our shift handover in Mission Control. Flight director Pete Frank, and the EVA team are now on. Spacecraft communicator for the lunar module Orion is astronaut Tony England, and astronaut Hank Hartsfield is handling the communicator chores for the command module Casper. Flight director for the command module is Don Puddy. At the present time Young and Duke aboard Orion, are preparing for their third period of extravehicular activity. The flight activities officer estimates that they're pretty much on the planned time line for that. We expect that they'll be getting out of the lunar module a little after 166 hours, perhaps 166 10 to 25, or between 9:45 and 10:00 am central standard time. We'll continue to keep an eye on their progress and report and update that expected egress time, as necessary. During today's 5 hour extravehicular activity, primary activities will be concentrated on sampling the North Ray Crater region, and the vicinity of the lunar module. Departing the lunar module, the traversel proceed to North Ray Crater, along the normal traverses path, there will be a single station in the vicinity of the old station 11 and 12 area at North Ray crater, and we expect to have the crew to spend about 1 hour 5 minutes sampling at this station. Then returning from North Ray crater, along the outbound path, they'll make a 20 minute stop in the vicinity of the old station 13, which is about 1 kilometer from the rim of North Ray crater. And here they'll do some documented sampling as well as taking a rake soil sample of North Ray ejecta. They'll then return to the area of the lunar module. We expect that they'll spend about 34 minutes in this area, and we'll concentrate on additional sampling. In addition, John Young will obtain an additional lunar portable magnetometer reading. Both with and without a rock. In the case with the rock, they'll be sitting a rock on the instrument and attempting to measure the soft component of magnetism in the lunar sampling in effort to determine if the so called soft magnetism that we've seen on return samples is actually indigeous to the sample when it's picked up on the moon, or if it perhaps something that's introduced to the sample by the electronic equipment, rotating motors and so on in the lunar module, or by some other magnetic field that it encounters on earth. For the 55, final 55 minutes of the 5 hour EVA, Young and Duke will be going through closeout. Getting samples bagged up, and boxed up and back aboard the lunar module, getting everything buttoned up and ready for liftoff, before the time that they climb through the hatch and seal up Orion for the final time prior to LM liftoff. Ken Mattingly aboard Casper, was awakened on the last revolution. He is now behind the moon out of radio contact. We'll be reacquiring Casper in about 11 minutes 50 seconds. Spacecraft now on it's 47th revolution of the moon. Mattingly is again in good spirits. He has a busy day ahead of him. Now, one of his major activities will be preparing for the rendezvous and

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 8:35 GET 164:53 614/2

PAO subsequent docking later today. In conjunction with this, we read him up the preliminary procedures to the lunar orbit plane change maneuver. This puts the command module in the proper plane for the rendezvous and docking with the lunar module. That maneuver to be performed approximately 169 hours 10 minutes, but we'll refine that time. Our flight plan for that event is still not precise. We've got in block times, but not precise times, but on the scale it will appear to be about 169 hours 15, and we'll as I say, getting a more precise time on that.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 9:00CST 165:17GET 616/1

ORION Okay, verify main tank. Okay, go to B.
You have a stone. GARBLE a press flag, OC momentary. And
an ear full of orange juice.
ORION And an ear full of orange juice. Forward B.
Okay, I think. Okay, Houston, how do you read, over.
CAPCOM Okay, five-by Charlie.
ORION Okay, John you go to B and I'll go to A.
ORION Okay. I go to B and GARBLE in A.
ORION Okay.
ORION Okay, Houston, how do you read us, over.
CAPCOM Okay, still five-by.
ORION Okay, fine.
ORION Hey Charlie
ORION Okay, I'm in AR.
ORION GARBLE.
ORION Houston how's the COMM in the TM room.
CAPCOM Okay. We got good TM.
ORION Looks like I got a little better than
90 percent on the 02 and I got 94 percent.
CAPCOM Okay, we copy.
ORION Okay, final systems set. Going to give it
a shot of cold water.
ORION All righty.
ORION And it's the cold. Jack we went through
an GARBLE SC is open.
ORION Okay.
ORION PLSS antenna is open.
ORION GARBLE.
ORION It is.
ORION GARBLE.
ORION It is.
ORION GARBLE.
ORION They will be. We don't have to GARBLE.
GARBLE the egress verifier.
ORION Okay, that's got to be done right now.
ORION Go ahead.
ORION Can't get any OMNI with this verifier.
CAPCOM Okay, go ahead.
ORION This thing released to auto verifier.
CAPCOM Go ahead.
ORION Okay GARBLE. GARBLE (heavy background noise)
GARBLE.
ORION There's MA. B to OPS GARBLE on that rock.
ORION That's okay. Need a purge valve.
PAO This is Apollo Control at 165 hours
21 minutes. The crew has completed their communications
checks with Mission Control. They are now in the process

of getting a cabin closed out, ready for depressurization. Flight director, Pete Frank has just reported that they appear to be about 30 minutes ahead of their schedule at this time, a revised estimate now on egress is 165 hours 55 minutes or about 35 minutes from now which would put them out at about 9:35 to 9:40 Central Standard Time.

ORION Okay, you're in load lock GARBLE up.

PAO We also have some updated time for the lunar orbit plane change and for the LM liftoff. We are now showing 169 hours 17 minutes 38 seconds for the plane change maneuver that Ken Mattingly will perform in the command module the CSM Casper and our LM liftoff time, which is subject to change somewhat, by a matter of seconds, probably, now 175 hours 43 minutes 30 seconds.

ORION Get that up.

ORION Okay, it's up Charlie. Go on.

GARBLE. Okay, that's the end that came off. Damn bracket.

ORION Okay.

ORION Want a drink of water?

ORION Yes.

CAPCOM And Charlie, did you verify you put GARBLE on your camera?

ORION I will absolutely verify that.

CAPCOM Okay, good show.

ORION GARBLE down there.

ORION GARBLE.

ORION Okay, GARBLE.

ORION GARBLE. (Heavy background noise).

ORION Okay, fix your mike.

ORION That's better.

ORION That's a GARBLE for staying on.

ORION GARBLE. Okay.

ORION GARBLE.

ORION Okay, did you turn the fan on, John?

ORION Yes the fan is on.

ORION Okay don't helmet before you GARBLE position okay GARBLE to GARBLE first.

ORION GARBLE.

ORION GARBLE.

ORION Put your old GARBLE right in there.

ORION Okay. GARBLE. GARBLE.

ORION GARBLE. GARBLE.

ORION GARBLE (background noise).

ORION Uh oh.

ORION GARBLE.

ORION Okay.

ORION GARBLE.

ORION It's GARBLE now. GARBLE.

ORION It did.

ORION GARBLE.
ORION Is it on?
ORION Yeah it's on.
ORION GARBLE. GARBLE.
ORION Hey, turn around let me get the velcros
down the back, John.
ORION Okay GARBLE.
ORION GARBLE on your thermal short back there.
ORION All right. Okay, I've got it, Houston.
ORION GARBLE.
ORION Now that slipped off the bottom,
we'll fix it when we get outside.
ORION Yeah.
ORION All set.
ORION Yeah, let me check the Velcro.
ORION Okay.
ORION I can do it better from this side here.
ORION Sure.
ORION GARBLE. Hike my mode switch up.
GARBLE. And it's all lined up.
ORION Okay, why don't you GARBLE

END OF TAPE

YOUNG No, it's not locked.
DUKE You want me to stand up, or you stand up?
YOUNG You stand up, Charlie, (garble).
DUKE Okay.
YOUNG The top of your head is deeper as we're
going down, Charlie.
DUKE (garble) on the top of my head.
YOUNG Check the back and make sure the O2 hose
to the other one.
DUKE Are you going to use the film?
YOUNG Say, this thing is (garble) Charlie.
DUKE (garble)
PAO This is Apollo Control at 165 hours 29 minutes
and we're still progressing toward an egress somewhat earlier
than planned. About 165 hours 55 minutes is our predicted time,
about 27 minutes from now. There are two potential problems
which we -- neither of which we expect be of any concern. We'll
be passing some information up to Young and Duke as soon as
they get outside and get on the lunar communication relay unit
which should greatly improve our communications with them. Yes-
terday, in the second extravehicular activity, the crew had a
period of time where the rear drive was not operating on the
lunar roving vehicle, now they were able to correct that by
a configuration change. We expect that that configuration will
continue to work for us today and till the crew should experience
no problems with the rear drive. Should have both front and
rear drive. However, in the event that they do not have the
rear drive, that also, would be of no particular concern. It
would not affect the performance of the lunar roving vehicle
greatly. Perhaps, slowing it down a little bit on the uphill
drives but it didn't even when they were operating without the rear
drive yesterday. It didn't seem to have a great effect on their
speed except on going up steep hills, and it would not effect
in any significant way the battery reserves. We do expect that
from the experience yesterday that the LM batteries or the
lunar roving vehicle batteries may again get a little warmer
than had previously been expected. You may see some activity
with the crew changing configurations to relieve the load on
one battery or another as we watch the temperature crews here
in the Control Center and determine how best to juggle the loads
around to keep the battery temperatures even and as low as
possible. Again, we don't expect this to cause any problem as
far as the EVA itself is concerned. One other potential
problem that cropped yesterday was a temporary problem -- what
we think was a temporary problem with the navigation systems.
The crew was asked to zero the navigation system on the rover
when they returned to the lunar module. They did this. We

PAO got a short bit of data from it after that which indicated that the problem may have been temporary and we'll give it a try again today with the hope that it will work.

YOUNG They unlocked.

DUKE Okay.

YOUNG And I covered them.

DUKE Okay.

YOUNG You already unplugged yours, huh?

YOUNG Okay, here we mark.

PAO One additional change in our flight plan schedules which affects television. During the rendezvous and docking, we had originally planned to have television coverage of this because of the lunar module high gain antenna, the LMP's steerable antenna is not functioning, the lunar module operates on the OMNI directional antennas. We experienced the problem prior to the LM landing where the relatively weak signal strength of the lunar module coupled with the comparatively much stronger signal strength from the command module high gain antenna was saturating the receivers on the ground stations and we were blocking LM communications. In order to avoid this sort of problem, we will not use the high gain antenna on the command module so that we get a more balanced signal strength level from the two vehicles and don't run into this saturation problem. Because we won't be using the command module high gain antenna, we also will not be able to receive television during the rendezvous and docking activities.

YOUNG We dock around here -- (garble)

YOUNG (garble)

YOUNG Wait a minute, Charlie.

DUKE What.

YOUNG (garble).

DUKE Make it stiff.

YOUNG Let me get one of them. Okay, I got this one out. You may set -- there we go.

YOUNG There we go. That dust --

DUKE (garble)

YOUNG Winding up the old watch.

DUKE Let me do it, John, and then you can get my right one too.

YOUNG Get it, Charlie.

DUKE Okay.

DUKE Thank you, John.

YOUNG (garble)

YOUNG Okay, now it's right.

DUKE Did you get it?

YOUNG Seems right.

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DUKE (garble)
YOUNG There we go.
DUKE Now.
YOUNG Too much trouble -- I thought we were going
to have it finished.
DUKE (garble)
DUKE Okay, got (garble)
YOUNG Okay.
DUKE (garble)
YOUNG Going off?
DUKE Let's hope it's coming off.
DUKE (garble)
YOUNG (garble) under the egress on the first REV
3 meters. The pressure tank is checked.
DUKE Okay.
PAO This is Apollo Control. Flight Director
Pete Frank has just completed going around the room checking
status with his flight controllers particularly with the
LM systems engineers and the report comes back that we're
go for cabin depressurization. The crew has some pressure
integrity checks to make on their suits and a couple of other
checks and then they will be ready for the egress. Our best
estimate on that is about 165 hours 55 minutes.

END OF TAPE

PAO (garble) on that is about 165 hours
55 minutes.
DUKE Okay.
YOUNG (garble) to (garble).
DUKE (garble). 02 (garble). Okay.
DUKE (garble).
YOUNG Okay (garble) push. (garble) over 3.
up 38. (garble) as you know is 385. Okay let's turn off.
The (garble) off.
DUKE Okay. (garble).
DUKE Okay.
YOUNG There goes mare.
DUKE Mare Houston (garble). Can you get
my (garble).
YOUNG Okay. Here's the rock Charlie.
DUKE Okay.
DUKE Did you get that (garble) Houston on
that (garble) check?
CAPCOM Yes sir. Sure did.
CAPCOM Okay that's about a minute.
DUKE Okay I'm to 365.
YOUNG 385 or 365.
DUKE I went from 38 to 36 Tony. (garble).
CAPCOM Okay.
YOUNG Okay your's is on.
DUKE (garble). Okay read on.
CAPCOM Okay turn the page to --
PAO This is Apollo Control at 165 hours
41 minutes. Young and Duke continuing to move along at a
good clip in they're EVA preparations. And we're now
predicting that they will be ready to get out of the Lunar
Module in as little as 10 minutes.
CAPCOM And when you get there we'll go for
depress.
DUKE Okay. Okay. Okay (garble) breaker 16,
(garble) to open.
YOUNG Okay.
DUKE (garble) need that circuit breaker open.
John I can't get that.
YOUNG Okay.
DUKE Okay repress is open.
YOUNG Okay then repress valve to close.
DUKE (garble) closed.
YOUNG (garble) opened at auto at 3-1/2.
(garble) Charlie?
DUKE I got it. Okay going open.
YOUNG Okay 3-1/2 mark.
DUKE Okay (garble)

YOUNG Okay (garble) 3-1/2 (garble) at 4.6.
 4.3 (garble).
 DUKE (garble).
 YOUNG Check. (garble).
 DUKE Go ahead.
 YOUNG (garble) said (garble) open up the valve.
 DUKE Yea.
 YOUNG Okay. Start (garble) and open the valve.
 Okay (garble).
 DUKE Yea.
 PAO We're watching the cabin pressure coming down. We've reached 3-1/2 pounds per square inch and we've started the clock now on the portable life support systems. That clock sat at 5 hours, which is the plan duration of this extravehicular activity.
 CAPCOM You fellows are doing really great. You're about a half hour ahead.
 DUKE Thank you. Going to get this thing memorized after the third time, Tony.
 CAPCOM Yes, you're really getting it down.
 YOUNG We got it.
 DUKE What we need to do is do it 10 or 20 times up here and you'd probably be pretty good at it.
 YOUNG (garble) away. Okay I've a 140. (garble).
 DUKE (garble).
 YOUNG (garble). (garble) we're coming up on 2 minutes.
 DUKE (garble) a minute (garble). Okay 2 minutes.
 YOUNG We down to zero on the guage. Want to try it now?
 DUKE Yes. Get my arm out there anyway. Hey, you got it?
 PAO When Young and Duke step onto the lunar surface this third EVA, the predicted temperature in the sun on the surface will be about 185 degrees. That's risen from about 90 degrees fahrenheit that we saw during the first EVA as the sun elevation continues to climb.
 DUKE (garble) the water.
 YOUNG (garble).
 DUKE Can you get the (garble)?
 YOUNG No. Now the water's on. Get your's, Charlie?
 DUKE Got it.
 DUKE Tony, somebody's got an open mike down there.
 CAPCOM Okay.
 YOUNG Charlie, it's going to be hot out there today. I (garble).

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DUKE Man I've (garble). I agree with you.
YOUNG Can't believe that shadow. (garble).
DUKE Look what kind of sun angle we got now
Tony.
YOUNG (garble).
DUKE (garble).
YOUNG (garble).
DUKE Tony, how does the feedwater pressures
look?
CAPCOM Standby one.

END OF TAPE

ORION Okay, mine's clear, John.
 CAPCOM Okay, as soon as you're flags clear you're
 GO for egress.
 ORION Roger.
 ORION Okay, flags are both clear.
 CAPCOM Okay, outstanding.
 ORION I think -
 ORION That's as bad as (garble) Charlie - can't
 even turn around.
 ORION Hey, your PLSS is on the - there you
 go. Okay, you're lined up great today, John. Okay, come to my
 side a little bit. Get down a little bit if you can. Don't
 hand up your PLSS on harness. Okay, I -- There you go. Okay,
 John is on the porch, Tony.
 CAPCOM Okay.
 ORION Almost.
 YOUNG Okay, Charlie (garble)
 DUKE That thing's so heavy.
 CAPCOM Charlie, I'm surprised you admit something
 is heavy in 1/6g.
 DUKE Well, I can pick John and his suit up,
 but that (garble) bag I can barely pick up.
 YOUNG (garble)
 DUKE That's okay, here's 18 - (garble)
 YOUNG The cameras are in there.
 DUKE Okay, I'll start recorder in 0 (garble)
 and come down the steps repeat configuration (garble)
 YOUNG Thank you, Charlie.
 DUKE (garble) lights are off.
 YOUNG (garble)
 DUKE Okay, Tony. I'm coming out.
 CAPCOM Okay.
 CAPCOM And out again on that sunny Descartes
 Plains.
 DUKE There isn't any plains around here, Tony,
 I told you that yesterday.
 CAPCOM It's a lumpy Descartes Plains.
 DUKE A what?
 CAPCOM A lumpy Descartes plains.
 DUKE There you go. Understand. (garble)
 YOUNG Hey Charlie, I'm putting the ETB on
 the floorboard and I'm going back and move the TV camera.
 Here, I'll read this before I do.
 DUKE Doggone.
 DUKE Let me put your antenna up, John, if
 you get a chance.

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 9:30 GET 165:47 619/3

CAPCOM is magazine mike.
DUKE Okay.
CAPCOM And while you have it in your hand, we'd
like a pan of Stone Mountain with it.
DUKE Okay, I don't have it yet.
CAPCOM Okay.
DUKE That's - okay.
CAPCOM And Charlie, we'd like the LCRU on
internal.
DUKE Okay, John can get that, he's right there.
CAPCOM Okay.
YOUNG LCRU has gone to internal.
CAPCOM Good show.
DUKE Is that internal, Houston?
YOUNG Yes.
DUKE Okay, Tony. It says magazine R to the
right seat, I'm going to put used magazines, make it N -
CAPCOM Okay, that's fine.
DUKE On the DAC. We used up R yesterday.

END OF TAPE

DUKE On the DAC. Used up R yesterday.
CAPCOM Rog.
DUKE Magazine Mike.
YOUNG Okay, the battery covers are closed tight.
CAPCOM Okay.
YOUNG (garble) covers are open 100 percent. I'll
dust it because the old - PLSS and the battery covers got dust
on all the way through, I suspect.
YOUNG Okay, Charlie. You're taking the ETB to the
table. I'll get the big rock bag.
DUKE Okay.
YOUNG Where does that go.
DUKE It goes - let's see. It says unstow it. We
could put it - I guess you could hang it anywhere.
YOUNG (garble)
CAPCOM Okay, the big rock bag should go in the hand
tool carrier.
YOUNG Okay. You want it on the hand tool carrier?
CAPCOM That's right.
YOUNG I thought they didn't want the big rocks bouncing,
but they might as well, uh.
YOUNG Okay, it's going on the hand tool carrier.
YOUNG And the big rock bag is on the hand tool carrier.
CAPCOM Okay.
CAPCOM And John, verify that's you got the new battery
for the LCRU.
YOUNG Nope, sure didn't.
DUKE Okay, Tony. Your 500 is complete. I'm up to
frame count 65.
CAPCOM Okay, on Mike 65.
DUKE That's affirmative. And I got a horizontal
pan east to west, 3 levels of it.
CAPCOM Good show.
DUKE Top to bottom of the mountain.
CAPCOM That should make them all happy. How about
those lineations. Do you see (garble).
DUKE In the lineations, you can see - yea, yea, their
still there. They seem wider apart today than they did yesterday
though.
CAPCOM Okay.
YOUNG Okay, install bag (garble) bag to HTC. Okay.
CAPCOM And we got a picture. And we got a picture.
YOUNG Super.
YOUNG 4 at 250. There it is. Frame a second. Set.
It's going on the boulder. But that's where it goes. North Ray
wager up here. The LCRU battery is sort of hanging up, Houston.
CAPCOM Okay.
YOUNG Go to the AMPS, Charlie.
DUKE Under the seat here. Just a minute, John.
YOUNG So hammer it out.
DUKE (garble)

DUKE It's not in here, it's in that - oh yea, here
it is. Wait a minute.
CAPOCM Okay, it should come straight out of the MESA.
All you can do is jiggle and pull.
DUKE (garble)
DUKE Yes, I know that.
DUKE It's been, it's always, that battery has always
done that, and your right in a - let me, let me hit it (garble)
YOUNG Charlie, Charlie, let me do this.
DUKE Okay, go ahead. I'll take a picture.
YOUNG Okay, I got it out, without doing anything.
CAPCOM Okay, good show.
YOUNG (garble) It's going under the left seat.
DUKE (garble)
YOUNG It's a little Descartes.
DUKE Let's see, it's about plus E. Couple of feet
or so. That one down.
CAPCOM And fellows, we're going to do a handoff in
a few minutes. We may lose comm for a second.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 9:50 GET 166:08 621/1

CAPCOM And, fellows, we're going to do a handoff
in a few minutes. We may use (garble) comm for a second.
YOUNG Okay. Okay, Charlie, you got the EPB
loaded, right?
DUKE Yes, sir.
YOUNG The big rock bag is on the hand two carrier.
YOUNG And the U.S. flag. Put the colors away.
YOUNG That BBC is closed.
YOUNG You already got those, huh, Charlie?
DUKE Yes, I turned on the TV for them and all
the externals -- okay, Tony, pan is complete.
CAPCOM Okay.
YOUNG Where are you, Charlie? I'll load you up.
DUKE Okay.
DUKE And get you some bags, John.
YOUNG Okay, well this one here goes on me. It's
bag 4.
DUKE Okay.
YOUNG Then -- I could pick this one only bag
but FDFP in it.
DUKE Let me put that one -- is that the
FCAC? Yeah. Want me to put this one on you?
YOUNG Yeah, okay. Yeah. Okay. Pull the strap
down.
DUKE It slid out from under you, John. Yes.
YOUNG Straighten up or bend over.
DUKE No, you just stand right there.
DUKE Okay, John, that's got it. Let me cinch
you up on your harness just a little bit here.
YOUNG Okay, how do you want me to get into that?
DUKE That's fine. Just right there. Jumped off
the ground, huh?
YOUNG Yeah.
DUKE Okay, you're done. Now I'd better get up
some off (garble).
YOUNG Now we let the heater ODM. I never did get
that. There, it won't hurt.
DUKE Tony?
CAPCOM Go ahead, Charlie.
YOUNG If it sets right. It hadn't been running
for the past three days.
DUKE I never did get that heater breaker open.
Remind me of that when we get back.
CAPCOM Okay, after the EVA.
DUKE Fine.
YOUNG Hey, Charlie, let me close your top there.
YOUNG Okay, babe.

CAPCOM That's no problem, Charlie.
 YOUNG How do you like about Gibson.
 DUKE Okay, fine, Tony.
 YOUNG Think it was.
 DUKE Okay, all set?
 YOUNG Yeah.
 DUKE Okay, you're going to --
 YOUNG I'll reset the UV.
 DUKE Okay.
 DUKE Okay, Tony, looks like we're 10 minutes
 ahead and we're ready to move out.
 CAPCOM Okay, good show. You fellows are really
 getting through it.
 TOUNG Hey, Champ, did I give you that battery --
 YOUNG Did I give that battery temperature,
 Houston?
 CAPCOM I didn't hear it. If you want to read
 it off, yeah.
 DUKE Okay, Tony, I'm going to put you on
 position 1.
 CAPCOM Okay.
 YOUNG Okay, now what.
 DUKE 170 F is black or it looks black. Actually,
 there's so much dust on it, I -- kind of bad to have black
 labels on a black surface.
 DUKE 170 F is black as you might suspect.
 CAPCOM Okay, we copy that.
 YOUNG Want to move the battery in the shade?
 CAPCOM Negative. We'd like to leave it out.
 YOUNG What do you want to do with the battery?
 YOUNG Golly.
 YOUNG Okay.
 CAPCOM Okay, I guess, we're changing our mind.
 We would like to put it in the shade.
 YOUNG It figures. Okay, back to the battery.
 YOUNG Okay, you want to reset the camera,
 right?
 CAPCOM Rog. Reset and I have the new settings.
 Azimuth 007, elevation 15.
 YOUNG Okay, reset. 007 and 15. Okay.
 YOUNG Set 007. 15.
 DUKE Okay. Go out here, John and see if I can
 find a landmark to get lined up on.
 YOUNG Here's the reset and level, and you
 heard the remote. To get to the sun now, Charlie.
 DUKE Yeah.
 DUKE Okay, if we could keep Crown Crater and

DUKE at -- there's a big one to the bottom, one down on the first terrace and then one on the second terrace. Those three sort of -- in a line coming home we got it.

CAPCOM Okay.

YOUNG Doing this for the lab, Charlie.

DUKE Okay. I'm coming. I got to go to mode which one before we start moving?

YOUNG Yeah. That and your checklist?

DUKE Yeah.

YOUNG Okay, well, let me get me.

DUKE Okay, why don't you bounce in.

YOUNG Good for a jump there, man.

DUKE There it is. Now suport the NAVO line by being able to get in the machine.

YOUNG Gee whiz, Charlie. I think you broke it.

DUKE I hope not.

DUKE Tony, a point -- that mission before but this seat belt adjustment was just perfect for me from the airplane.

CAPCOM Okay, good data point.

DUKE And --

YOUNG Me too? Seat belt -- Seat belts fastened. Okay, we're going back to the normal configuration.

CAPCOM Okay, that's fine.

YOUNG TMW is in both and the driving enable is in -- all those switches are up and gain is okay. Going to primary. We're in for a NAVO line.

END OF TAPE

YOUNG I think I'd better get up here on this level spot.

DUKE That feels pretty level.

YOUNG Yes, I reckon.

DUKE I reckon too.

CAPCOM Right. On the driving ables, we'd like the left rear and the right rear. Can you get it WM2.

DUKE Yea, we've got that. It's normal configuration.

CAPCOM Okay, good show. That's what we want.

DUKE Okay, we're in 3° right roll, 3° right roll. Hey, the pitch needle is behind there, and I would say it's saying 2° pitch up and if the little needle was right in the middle. But it isn't very much, Houston.

CAPCOM Okay.

DUKE What happened is the, on that indicator is that the - is that the dial is falling off, if you can believe such a thing. The little needle is still back there. It don't know the dial's falling of, and it's working fine. 1° right roll.

CAPCOM Okay, we copy that, and we need a SSP.

DUKE (garble) level pitch.

DUKE 3 and a half degrees right. Almost 4. No, 3 degrees right, excuse me.

CAPCOM Okay, copy.

DUKE And we're are - our heading is 264, if you can believe such a thing.

CAPCOM Okay, and if you want to power up the LRV.

DUKE It's about right on.

DUKE We're powered up. Okay 60 on the left. Okay 264 000 000 000 AMP hours is 60 115 all scale low all scale low, okay volts are 7 to 65 65, 102 120 all scale low, all scale low, and all scale low, all scale low.

CAPCOM Okay, we'll stick with the normal configuration you've got there, and we'd like to make, verify that you went back to AMPS on 3 up.

DUKE That's verified.

CAPCOM Okay. Okay, we've got 258 on the torquing angle.

PAO This is Apollo Control. This drive to North Ray Crater will be about 4.9 kilometers. They'll spend about 40 minutes getting there, about an hour and 5 minutes at the site. The abundance of breccias, or fragmental rocks, they discovered on the first two EVA's leads to the possibility that much of the rocks below the regolith consists of very old breccias dating back to perhaps 3 and a half billion years. North Ray is deeper than South Ray, which was visited yesterday, and may possibly penetrate this layer of breccias or fragmental rocks and get down to the volcanic material. This believed to under lie the area, and which may date back to 4 billion years. Hopefully the crew

PAO will be able to get some of this very old
crystalline rock by visiting the vicinity of North Ray Crater.
CAPCOM Charlie, can you turn that DAC off for another
19 minutes.
DUKE Hey, Tony. I'm going to be spinning it.
CAPCOM I'll give you a mark.
DUKE Okay.
DUKE Okay, it's off.
YOUNG I'll tell you this ridge up here would be
a good place to park the rover, Houston, if you want. We're reading;
I think it's working, it's reading 162 and 100 - 110 now. And that's
how far away we are.
CAPCOM (garble)
YOUNG This ridge would be a good place to park the
Rover. The Rover up north of it. I don't know if you can see
it at Thermally.
DUKE I don't think they can pan the camera like
that, when we liftoff.
DUKE Okay, Tony. We're topping out of the little
ridge. We can now see Dome and Smoky. On top of the ridge there
boulders much like we seen yesterday. Half a meter or so, cobbles
about 5 percent of the surface. Looks like a lot of secondaries
though. We have a - the boulder population is really concentrated
around the secondaries, and we'll get some pictures of that. The
regolith up here is identical. You can see these little lineations
which is, I think a function of sun angle.
YOUNG I think the boulder population is starting
to thin, Charlie.
DUKE I do to. They're getting smaller and the
cobbles are getting smaller. Like we could be just out of this
ray. We don't see any but maybe one or two of the half a meter
size boulders now, Tony.
CAPCOM Okay, we copy that. There are a couple of
mounds mapped about 200 meters off to your left. We were wondering
if you could see those.
DUKE Nope. I got 179 at 180 net .3, and topping
out really on top of a ridge here, and -
YOUNG Better go over this way more, Charlie.
DUKE Yea. There's North Ray right up there. Look
at the big rocks, John.
YOUNG Yea.
DUKE Okay, Tony. You got a good view of North
Ray here, and as we lock - as I look at it, there's a north-south -
north-east, south-west line of boulders that come out from the
south-west rim and go up to north-east rim out of Smoky Mountain.
YOUNG See there's Palmetto, too.
DUKE Yea, we see Palmetto. Coming down the ridge
now, we look like we're going into a big sag type area. It's at

DUKE 12 o'clock of 3 or 4 hundred meters, and we're
now at 188 at .4.
YOUNG Maybe we're into Palmetto right now, Charlie.
DUKE Un uh.
YOUNG Maybe Palmetto.
DUKE No, that's over there on the rim, isn't it.
YOUNG Uh.
DUKE That big thing right there. No, Palmetto's
at -
CAPCOM You should be about half way to Palmetto.
DUKE 2.1.
CAPCOM Your looking right below Turtle Mountain, we
bet.
YOUNG Yea, that's where we are.
DUKE Okay, up at station 11 and 12.
YOUNG (garble)
DUKE I'll tell you.
YOUNG It sure is.
DUKE Okay, we're going down slope at, Tony, about
a 5° slope and we're going to go down perhaps 50 or 60 meters before
we start climbing back out again towards Palmetto. And up around
North Ray, we see two tremendous blocks at about station 11 and 12
that appear to be black in color. Black with white spots, and there's
a, we just about out of the ray material now. We only see a few
cobble left.
CAPCOM Okay. It might be a good idea to try to get
for our station 11.
DUKE That's what I thought we were going to pick.
Those two big, big rocks.
CAPCOM Good.
DUKE It's right upon that ridge. That might be,
that's Palmetto right there, I guess off to the left there. Isn't
it, John. Cause we would be within 6 tenths through. Tony, we're
at 195 at 6 tenths, and there's a big depression off to our 2 o'clock
position on a heading of 030, with some white boulders on the inner
rim. It's a very subdued feature, but it does have, at least around
the rim. The south, wow, great.
YOUNG All right, Charlie.
DUKE The east side is a very shallow slope into
this pit.
YOUNG How far are we suppose to go this way, before
we turn back?
DUKE Just keep going. Straight out.
CAPCOM You should be a heading of about 356.
DUKE (garble)
DUKE Yea, now at 8 tenths you can turn to about 356.
YOUNG Okay.

DUKE Okay, Tony. This big depression off to the left that I was describing is, on the east side it's a very shallow slope into it about 4 or 5 degrees, but on the far end, the west side and the southwest side has very steep walls. 40 degree are so.

YOUNG (garble)

CAPCOM Understand. Your looking right at the base of Turtle Mountain.

DUKE (garble) John.

DUKE Okay.

YOUNG Listen, Houston. I hate to say this, but these mountains don't look the same.

DUKE Which mountains. (garble)

YOUNG Where's Turtle Mountain. Right here.

DUKE It's off to the left. Way off to the left. We just passed it. We could do a 360 and get a pan of it.

YOUNG How about that rock there, Charlie.

END OF TAPE

DUKE Well, we just passed it. We could do
a 360 and get a pan of it.

YOUNG There's my bedrock there, Charlie.

DUKE And it's got some lineations in it huh?

YOUNG Yes, look at the size of it.

DUKE Oh, this big one coming up you mean.

YOUNG Yes.

DUKE Yes. Hey, Tony. It seems to me this is
a more subdued surface over here then going towards South Ray.
Not as many craters, it's almost - except for 3 or 4 meter
sized craters, it's all subdued, and just hummocky and
rolling.

YOUNG Yes, that's true, it's much better driving,
we're doing 10 clicks.

CAPCOM Outstanding. Could we have an amp read-
ing?

DUKE 20 - hey there's about a 4 meter boulder
over to our - with a good fillet -

YOUNG Oh, that's nice. That's been there for
awhile.

DUKE We're just passing at 195 at point 9 and -
its rounded.

CAPCOM Okay. How are we doing now on the rounded
verses -

DUKE We seem to - okay most of them over here
are, I'd say probably a good half and half, rounded to angular.

CAPCOM Okay.

DUKE There are some small indurated secondary
craters. And as we approach Palmetto, the boulder population
is beginning to pick back up.

YOUNG This boulder right here, Charlie.

DUKE If it is we've got to - I don't - I think
it is John, yes right up there to the left. It's a - we've
been 1 point, I think, and we're not quite there yet. We've
got to go in this setting for one - Okay, Tony. If you look
to the northeast, you get quite a spectacular terrain view of
rolling hills, occasionally, pock-marked with large boulders,
the craters are very subdued and the hill almost appear smooth
off to the northeast, occasional craters. That might be a
function of the sun angle though.

CAPCOM According to our track, you're a little
bit east of -correction, west of course and probably a 005
heading would take you right along the rim and -

YOUNG Yes, that's what I'll do.

DUKE I think we're coming up on the rim now,
John.

YOUNG Right, Charlie.

DUKE There it is, there it is. Beautiful.
Okay, Tony we popped out on the rim of Palmetto and hit it

DUKE right on the nose at 1.2 at 189 and it's a tremendous crater. The walls to the south - correction, northwest - south - wow.

YOUNG Sorry, Charlie, I got to keep my eyes on the driving.

DUKE That's great. And to the southeast here, are steeper than the walls to the northeast, apparently, it looks like it's almost breeched to the northeast.

CAPCOM Okay.

YOUNG Jchn's cutting away from the rim now cause it's a little easier going. There's a good ejecta blanket of half meter sized boulders around the rim of Palmetto and to some of these secondary craters here.

CAPCOM Okay, do you have an estimate of -

DUKE Palmetto is as big as Metius isn't it? It's an - okay, in cobble size, my usual size of being cobbles, I'd say 30-40 percent of the surface. Let's make it 30 percent and the half meter size of maybe one for every 10 square meters.

CAPCOM Okay.

DUKE Okay, we're just traveling right around the - traveling about 100 meters inside the rim, and we're at 195 1.4 now.

CAPCOM Okay.

DUKE 1.7 is the distance. Okay, and to the northeast, Tony - northwest, correction - you can see large blocks on the rim on the-

YOUNG Hey Charlie there's Dot.

DUKE Yes, I see Dot, great, hanging right in there, right on the rim. You won't be able to see the road or yes you'll be able to see Palmetto from there. Okay, the large boulders or there seem to be 3 or 4 meters to the northwest on the flank of Palmetto, but I think they came from North Ray. Over.

CAPCOM Okay. Understand they're angular?

DUKE Angularity is sort of rounded.

CAPCOM Okay.

DUKE The - apparently the only thing preserved here is large blocks out of North Ray, but I don't see very many small ones. I think traffic ability is going to be excellent. Though it looks like a steep slope climbing that rim doesn't it?

YOUNG Oh, not too bad. It's not near as bad as Stone Mountain.

DUKE Okay, the boulder field out of North Ray does not reach the ravine, Tony. It stops on the outer flank of the ravine about a tenth of a crater diameter away.

CAPCOM Okay.
DUKE Okay, most of the rocks here are rounded and have some real good secondaries. The types are very difficult to identify, as we go by. We're now at 193 at 1.7. The map system seems to be working super.
CAPCOM Outstanding.
DUKE Palmetto has a very definite raised rim to it, and we're going to be going off the rim down a probably a 5 to 10 degree slope into a valley before we start climbing up to North Ray.
YOUNG That's a real valley, too, Charlie.
DUKE Yes, I'll say. And these valleys in here, Tony, tend to trend toward Big Sag.
CAPCOM And Charlie could you go ahead and put that DAK on that?
YOUNG Yes - yes put it on now, Charlie.
DUKE Okay. Okay, it's running.
CAPCOM Good show.
DUKE It's not pointing up there. And I've got it pointed off to the right or left, excuse me.
CAPCOM Your other right.
DUKE Okay, we're now in an area, Tony that is 195 at 1.9, that is about half meter size boulders every 5 meter square. Some of these blocks are angular, they're fractured. They appear to be grayish in color, dust covered and most all of them have fillet. Man look at that slope. That's the Encke crater right there, John, just over that rim there, just to your left Hey Tony, Encke Crater is on a 10 to 12 degree slope pointed toward North Ray.
CAPCOM Okay.
YOUNG Hey, we're traveling due east here for awhile to pick up a little smooth ground.
DUKE What do you say, are we going down a 5 degree slope here or 10?
YOUNG Yes, Charlie, 5 to 10, about 10.
DUKE Yes. Okay, Tony, we're about maybe a half of a crater diameter to the northeast of Palmetto, about a 10 degree slope and the boulder population is about 5 degrees here. And the small cobbles have just about disappeared. Very smooth regolith except for these 20 to 30 centimeter boulders, which are not very numerous. We're really moving out downslope at about 12-15 kilometers an hour.
CAPCOM Okay.
DUKE It's remarkable how subdued all these craters are, it's almost a smooth plain except for a few of the 5 meter craters or so, the 1 meter size and all and smaller are all just about gone, apparently, very subdued. Okay, John were at 22 at 195. We'll swing the -

END OF TAPE

DUKE We'll swing the camera around towards the sun. Switching off to the right now. Let's bear a heading here from 22 to 195, Houston.

CAPCOM Okay.

DUKE Okay, In Crater was 21 should - what they want is about - just directly north, John.

YOUNG Forward.

DUKE Yeah, it looks great to me on that Heading.

YOUNG Yeah it looks like -

YOUNG Well, we're down to about where the rock modulation is almost nonexistent, I hope it stays that way for a while.

DUKE It is.

CAPCOM Ya'll are making GARBLE outstanding down there.

DUKE It's really easy going, Tony. Well he's got his full blower into 11 clicks and we're just going over undulating terrain. The ridge lines here are predominantly trend east west and they are about 5 meters in relief and really the only significant craters that you have out here are the ones that are 5 meters and larger and they are only maybe covered 30 percent of the surface. Look at that view.

YOUNG Look at those boulders.

DUKE Look at those rocks. Tony, there are some tremendous boulders on North Ray, they get bigger as we go narrow.

YOUNG Okay, one reason why North Ray looks like in photos it had steep walls on one side is because the rim is raised on one side, higher than the other, don't you get that impression, Charlie.

DUKE Yeah, I sure do.

CAPCOM Do you think you'll be able to recognize the edge of GARBLE?

DUKE Looks like - well I don't - we'll give you a try at that - right now I can't.

YOUNG I think we're starting to get into it right now, Charlie.

DUKE Well the cobbles of boulders is picking up. We're at 26 Tony at 199, 192 and beginning to pickup high frequency, maybe 10 percent now of cobbles and boulders. John, I think it looks like - see that white boulder dead ahead - it looks like the greatest variety of boulders is going to be over there, but that is part of the east and our station 11 but further north than station 11 is called for. It's almost at the split of Smoky -

YOUNG GARBLE we've got up here.

DUKE Okay, I'd love to.

CAPCOM Okay, and you may get a caution flag on battery 2 temperature, I just reset it and press on.

YOUNG Understand, reset dress.

DUKE Okay, Tony in this area now for 192 at 2.7 we're getting a greater frequency of 1 meter size craters and it's making it a little bit bumpier ride.

CAPCOM Okay, you might watch for a changer, (GARBLE) or albedos on there.

YOUNG That's what we're watching for I get the real change --

DUKE Uh oh me -

YOUNG A little closer to the GARBLE.

DUKE That's one of those sharp craters out - they call it the map sharp out here the plain. John I don't think we're going to go straight between those two big rocks, I think we're going to have to - looks to me like that's a pretty steep slope if we swing them a little bit east here and then go up just on the edge of that boulder ray right there we'll make it.

YOUNG Over here.

DUKE Okay.

DUKE Okay, Tony now that we get over here and can see down off the flank of North Ray we can see good boulder rays out of North Ray that go for perhaps - I'm going to say half a crater diameter, boulder is greater than a meter size.

CAPCOM Okay, could you take a look up at Smoky area there and see what kind of structure and texture you can see on the face.

DUKE Pete, been looking at that - can't see anything except for a couple of rays - the boulders out of North Ray - the trend one goes almost into Ravine that I described and one goes on up to the top. In the northeast wall or ravine you can't see the lineation. To the northeast there are tunnels to the north they are dipping east about 30 degrees.

CAPCOM Okay, can you push your camera up that far to get a picture of that?

DUKE I don't want to brake my RCU bracket - I don't think I can - wait a minute I'll take the camera off and do it.

YOUNG Charlie, don't do that.

DUKE No sweat.

YOUNG Take a picture of that crater we're driving off the road ahead we're going through.

DUKE Oh, yeah, I did.

YOUNG That's a nice one.

DUKE Okay, Tony there's a - that to me looks like just a big seek feature John. Tony the road - the map had us

going -

YOUNG Okay, we're definately in the regolith now, Houston because see how all these rocks are all laid in there. Remember how it was up at that crater - at Schooner.

DUKE Yeah.

YOUNG Those rocks are laid into the ejecta blanket. That's where they came from.

DUKE Okay, Tony at 191 at 3.1 we're coming into some good size whitish looking rocks that are 3 and 4 meters across, they are fractured. That's probably a permanently shattered sample -- no that wouldn't be --

YOUNG If you didn't know better you say that they were bedrock outcrops, but they are just laid in there I'm sure from North Ray.

DUKE And as we go to the southeast side of North Ray there is a big sink feature - a big pit that's elongate east west and we could drive in it from the east, but once you get into the south of south ray it is really a deep pit, Tony. And that ridge line that we saw from the LM is on the west side of that deep pit. It's probably a hundred meters below the rim of North Ray, over.

CAPCOM Okay, we copy that. And on the boulders you are looking at now that you think might be thrown in, you might talk about the fillet sizes away and towards the crater, see if that corresponds with the secondary.

DUKE Okay, well we - okay, we passed - we are not close to any of them right now. We're in a very smooth area. We're in this - at 3.4 at 190 we're down in this area where I've just described it - it goes into that big pit off to our west.

CAPCOM Understand.

DUKE About a crater diameter from North - about a crater diameter from North Ray off to the east I see some 3 meter boulders that are all rounded and sitting in the ejecta with - or in the regolith with good fillets. Okay, now here's one, Tony out to the right.

YOUNG The bag fell off again, Charlie.

DUKE GARBLE. It did.

YOUNG Yeah.

DUKE That's not supposed to happen. Okay with the 2 meter size boulder with a fillet that's equi- Looks like sort of equi-dimensional around the - around the boulder. GARBLE.

CAPCOM Okay, I understand. Did you see any GARBLE.

DUKE Another 1 meter.

YOUNG GARBLE.

DUKE They just look whitish to me.

DUKE (garble) looking one. And then there's a solid white one off towards the -- just right at the base of Smoky Mountain in North Ray. That might be worth a little jog over there if it's not too far. It's the most unique white boulder we've seen.

CAPCOM Okay we'll keep that in mind on the way back.

DUKE Okay we're at 37 and 186. And we just passed some very, 2 sloppy looking boulders. The biggest one is perhaps 5 meters across and they have vertical joining or fracturing to them and they have a frosty appearance to them. And I'm about 20 meters from it now.

CAPCOM This sounds really great.

DUKE Okay so -- man, that is a big rock.

YOUNG Yea.

DUKE Okay Tony there's not any half size rocks but the biggest ones are maybe 5 meters. And it's really smooth except for these big rocks out -- out here, it's smooth going.

DUKE There's a real fresh little crater right there. See the raise off to the left.

YOUNG Yes.

DUKE It's about a meter size.

CAPCOM Hey could you use a couple more words to describe that frothy rock?

DUKE It's got a hackly surface to it --

YOUNG It's black -- black in color. Right Charlie?

DUKE Yea.

YOUNG Okay we're going up a pretty steep slope right now Houston. I think we're almost to the rim, Charlie.

DUKE Yea we are. Looks like we're just about 20 meters from the rim.

YOUNG I'm going to slow down here.

DUKE (garble). How about hooking a right over here John.

CAPCOM We got you about 4 or 5 hundred meters --

DUKE (garble) coming to the rim. I don't believe it, but --

CAPCOM Okay we'd like you to go to 12 frames per second.

DUKE Okay. You got it.

CAPCOM Okay. This is going to make some great pictures here.

YOUNG Okay. We're on a relatively flat surface now.

DUKE Okay the rocks here Tony are all rounded (garble). Most of them -- 70 per cent are rounded and the

DUKE other ones are subangular. Mostly dust covered, grayish in color. The big rocks are not on the rim Tony. The big rocks are further away from the rim. At least we can't see any big rocks when we approach the rim, but we're climbing upslope.

CAPCOM Okay.

DUKE Man, look, there's a tremendous one -- there's a 10 meter boulder off to the right over there John. There's a fresh crater. Really fresh one that has a white interior that's punched in about 2 meters deep and that was at 181 at 4.0. Okay it looks like to me we're -- the rim -- hey there's some beautiful white ones over there.

YOUNG There we go.

DUKE John, at 2 o'clock. Think this is the rim, right here?

CAPCOM We still think you're about 500 meters to the rim.

DUKE We'll be able to sample these white ones. Here's some -- we are, there's the rim up there.

YOUNG Sure is.

DUKE Sure is, Tony. You were right. We described what we thought was the rim was one of these little hummocks.

CAPCOM Right.

DUKE Little hummocks -- it was a pretty steep hummock.

CAPCOM Just like mountain climbing. There's always another ridge.

DUKE Okay I'm going to pan the DAC around to get to that boulder field that goes up to north Smoky Mountain. It's really tremendous. The boulders are a very angular over there. They're dark gray in color. All or some of them are almost solid white. The most unique ones appear to be solid white. Up on the rim here they appear to be almost white, none of the dark ones. And we're at 180 at 4.1. Smooth regolith. Down the rim is left.

YOUNG The rim's right there.

DUKE No sir. I bet -- I bet it's over there to the left where those rocks are. But you might be right. That's too far away. You're right that's probably too far west.

CAPCOM We think the most direct routes from where you are to the rim would be about a heading of 350.

DUKE Okay. We're heading that way and there's a -- those white rocks are --

YOUNG Right on the rim Charlie.

DUKE Right on the rim.

CAPCOM Outstanding. Can you see on around to see if there are any black rocks around at 3 o'clock in the crater?

DUKE Well we can't see in the crater. But around at 3 -- at the 3 o'clock position yea there's a biggy. The biggest one Tony is this 10 to 15 meter boulder that is on the rim and it's blackish.

CAPCOM Okay is there any chance of working around towards that contact? If we could both the white and black in one stop that would be really fine.

YOUNG No way.

DUKE That's pretty far. I think we could do it with a short stop over there. And we might when we get up there Tony we might be able to find a black rock.

CAPCOM Okay fine.

DUKE Okay we're going through a -- we definitely on the ejecta blanket here. And, oh, within a 100 meters or so I think is the rim.

CAPCOM Right we have you about 100 meters from it.

DUKE It's white, crystalline white looking. Man you guys are right on. We copy that. We think y'all are right on.

YOUNG Yea we're 179 at 4.4 right now.

DUKE Okay, that's great John.

YOUNG He wants us to park -- 360..

DUKE Go on out to the rim.

YOUNG Okay that's a beccia. That white one is a breccia. There's the rim.

DUKE Yea there it is. Okay I think we can get over there, maybe get them a picture. We're headed about 360 aren't we?

YOUNG Yep.

DUKE That is that -- that big -- I can't believe the size of that big black rock over here. And I don't think that's a breccia John. But although it might be a -- I see some large white glass.

YOUNG Oh spectacular! Just spectacular!

CAPCOM Charlie, the DAC should be out of film you can turn it off.

DUKE I can't reach it.

CAPCOM Okay fine.

DUKE (garble).

YOUNG That will -- I guess not. What I'd like to do is park where it's flat and --

DUKE Okay. Okay where we came up over here John it won't be quite to -- They get a better view. Right here's where they get a great view of the -- of the interior.

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DUKE Of the upper third of the wall. Okay
Tony we're on the rim.
CAPCOM Beautiful.
YOUNG There we go if we stayed -- if we go
360 and park right here it'll be flat.
DUKE Great John. Super! Can't wait to get
off. Gotta get off.
CAPCOM We can't wait for you too either. --
DUKE Okay Tony --
CAPCOM -- about 13 minutes ahead of the time
line.
DUKE we at 36 -- 360179, 5.5, 4.5, 60, 115
off scale-low, off scale-low, 130, 110, 2 -- 225, 225 forward
motors, 200, 200 rear motors.
CAPCOM Okay what was that temperature on battery
one again?
YOUNG Okay, primary is going to off.
DUKE About 100 -- about 110 I think.
CAPCOM Okay got it. And Charlie we'll need a
frame count.
DUKE Okay (garble). Okay standby, I'm so
dusty ...

END OF TAPE

DUKE (garble) now?
DUKE Okay, standby for -- I'm still dusty.
YOUNG Okay. Going up halfway between the
intermediate and --
DUKE Gee, I don't, Tony. I can't read it.
Let John read it. John?
YOUNG What's that?
DUKE Read my time count.
YOUNG Hold still.
DUKE But I wanted to get in the sun so --
YOUNG 165. You better change that out.
DUKE Okay. Took a 165 pictures coming
up here, Tony.
CAPCOM Okay, and we concur on the changeout.
DUKE Okay.
DUKE I'm going to put another black-and-
white on key low.
CAPCOM Okay, key low.
YOUNG And look at --
DUKE Yeah, I'm walking down about -- I'll
get the TV for you.
CAPCOM Okay, and back off.
YOUNG Okay, and don't let me forget to get
the TV.
CAPCOM Yeah, okay.
YOUNG Man, does this thing have steep walls.
They said 60 degrees. Now, I tell you, I can't see to the
bottom of it and I'm just close to the edge as I'm going
to get.
DUKE That's the truth.
YOUNG Okay, going to two.
PAO The crew is now getting the high gain
antenna alined. We should have improved voice and also
television shortly.
CAPCOM There's a range along the edge of the
crater for about 80 meters. If you can do that. And Charlie, if
you'll start out with your pan one in the 500 millimeters,
we'd also like you to shoot some more pictures of Smoky
with the 500 and then take your fire field stereo, and
then if you range on out as far as you can go, we'd like
you to take the 500 millimeter with you, take -- and John
with you, take a stereo of the inside of the crater with
the 500 millimeter from as far away from the rollers you
can get, and then stick the 500 millimeter and John the
SEV and then do your other far field polarimetry and then
on all we've got is sampling.

YOUNG Okay, I think we probably ought to take all those things one at a time.

DUKE I do too.

CAPCOM Okay, fine.

DUKE Okay, do you want me to start out with the 500?

CAPCOM Right. Go ahead and start out with your 500.

DUKE Okay. Okay, Tony, I have magazine key low frame count 1, I think, it was.

CAPCOM And we've got a figure.

DUKE Okay. Those locks you're looking at now, Tony, are white and they look breccia to me. The big black one is off behind the TV. It took going towards the rim on the crater right now. The unfortunate thing about it, Houston, is that Radsley (?) rim -- it goes down -- it slopes in to at about 10 or 15 degrees. It kind of slopes updown on right now and then all of a sudden in order to see the bottom, I've got to walk another 100 yards down -- 25 to 30 degrees slope and I don't think I'd better. Maybe we can drive to the other side and see down into it.

CAPCOM Man, is that a hole in the ground.

DUKE Okay, Tony, the inside -- it really is. I see no bedrock, though. All I see is boulders around the crater. There's nothing that reminds me of bedding, just loose boulders, though, it might very well be it's so shocked that they could be real boulders -- I mean real bedrock there.

YOUNG Now, the layering -- the boulder layers are horizontally oriented and of course, they are all colored covered with talus over on the north wall in particular about one-third of the way from the top is a line of boulders which you'd probably ought to be able to see on the TV, but they're all oriented right in that line which would lean with the (garble) is standing there. Don't you see that line right over there, Charlie?

DUKE I don't -- I'm worried about trying to get this crazy camera going here.

YOUNG Okay. And --

CAPCOM Okay, that line of boulders on the north wall, what color were they?

YOUNG Just like -- it appear to be dark boulders.

CAPCOM Okay. You said there were white rocks you see there. Do they look quite the -- the comb crater type white rocks?

DUKE No, not to me.

CAPCOM Okay.

YOUNG Better let me get a piece of one, Charlie.

YOUNG I don't think -- this is definitely a breccia right here, a big foot and a half breccia. It's a white matrix with dark glass and it looks to be a three-rock breccia still on a dark glass and even darker glass than those.

DUKE Okay, Tony, I picked up magazine mike -- it's on the 500.

CAPCOM Okay.

DUKE Okay, Houston, I just picked up a glass sample of breccia. It's very friable. It looks shot and the black glass in it -- glass a couple of millimeters across and the -- it's so worn down that you know what it really looks like? It looks like a --

YOUNG You better use the analogy. I'm not sure what the heck it is. It looks like a truck. It just looks like a rock -- you see, the glass is sticking out is what I'm saying.

DUKE Okay, Tony, what kind of pictures do you want me to get with the 500? I've done the interior of the crater. Did you say you wanted Smokey or Stone Mountain?

CAPCOM Okay, we'd like some pictures of Smokey.

DUKE Okay.

CAPCOM And John, in you're mineral description, could you see -- crystal shape to it?

YOUNG Could I see a crystal shape? I saw one clase. No -- Now the glase in there are very angular maybe that's a Zach crater that's probably what I wanted to tell you. I don't see -- the white matrix doesn't have any crystalline structure that I can recognize.

CAPCOM Okay, fine.

CAPCOM And Charlie verify that you turned the DAC off.

YOUNG And, Tony, what is it you want me to do to this?

DUKE Yeah, I think so, I'll check again.

CAPCOM Okay, after the 500 millimeter -

YOUNG You want me to do here, Tony.

CAPCOM We'd Charlie there to go ahead and take the far field pan of the crater and go on around and do a full pan. It looks like you could probably do the thing from one place and John, we'd like you to start arranging out in the most -- the best traverse direction for about 80 meters if you can go that far and survey there as you go out and Charlie will follow you along and sample as you come back.

YOUNG Okay, that would be 80 meters to the

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YOUNG northeast here.
CAPCOM Okay, fine.
YOUNG No problem to do that and -- Okay, Tony,
pan is complete and I'm up to 165 on magazine mike.
CAPCOM Okay.
DUKE Okay, Tony, the -- my description of
the crater is covered -- 60 percent of it is covered with
boulders up to 3 meters -- make that 50 percent of it in
the interior. We cannot see the bottom. The boulders are
splayed out from the center in rays --

END OF TAPE

DUKE On the interior - we can't see the bottom. The boulders are splayed out from the center in rays that about every eighth of to a quarter of a crater you have a definite ray.

CAPCOM Okay, and John did you get bag number on that?

DUKE Do you still want me to take the 500.

YOUNG Yeah. Excuse me 373 I think.

CAPCOM Okay, we copy that.

DUKE It's in the bottom of STB 7. Anyway, I can identify that rock for you.

CAPCOM Okay, that's fine. Yeah, Charlie, that's only 500 millimeters.

DUKE Tony you still want me to get -

CAPCOM After your 500 millimeter do the far field pan and the 34 riser settings or the far side of the crater and then when you follow John along take the 500 millimeter with you.

YOUNG Okay, you want me to help Dodie, to get I mean Charlie to get the rock, you want to get the near field first, Charlie?

DUKE We're not doing it.

CAPCOM We're not doing it -

DUKE Yeah, okay.

DUKE There's its in.

DUKE Okay, John I'm going to bring a sample bag with that 500 millimeter in it so we won't -

YOUNG Okay, I - I've got a sample bag here.

DUKE Okay.

DUKE Okay, Tony, I'm starting this polaremetry from - from about the 10 o'clock position of the rover.

CAPCOM Okay, you're starting in the right position.

DUKE Yeah, I'm starting in the right position, I've got depth 6, 125th at 74. And I'll do a partial pan with each film - with each setting. It's going to be about an eighth picture pan.

CAPCOM Okay, good show.

DUKE And I wish I could see the bottom of this beauty.

YOUNG Better drop in my bag, Charlie.

DUKE Hey you dropped your bag, I thought you dropped them off the rover. Okay, that was in the right - going from right to left in the right setting - center setting going from left to right.

YOUNG There they are.

DUKE Sync.

YOUNG You didn't tell I dropped them - Houston.

CAPCOM Sorry John, didn't see it.
DUKE Okay in the left, okay Tony in the left setting going from right to left. Tony we can look out at the 12 that I put my 12 o'clock position here, I can look down and see a large block that's on this inner flank that I can't -
CAPCOM John, is there still something biting you? -
DUKE I can't tell you what type it is.
YOUNG Huh?
CAPCOM We thought we saw something still lying there where you fell over. Okay.
DUKE Okay, Tony, magazine Kilo, I'm up to 40 with a par field.
CAPCOM Okay, very good.
DUKE I'm in the left position - I'm going back to the right now. You want that stereo base, right?
CAPCOM That's right we'd like you to leave the polarizer on and take the 500 millimeter with you also and then range out your 80 meters. You can either take a STB 500 millimeter or stick to 500 millimeter in John's STB, when you're through with it.
DUKE We'll take one.
YOUNG I've got one Charlie.
DUKE Okay, your still open - where's yours that was on your back?
YOUNG Oh, it fell off enroute. I can't believe it.
DUKE Hey Tony if that thing fell off - the SCS-C was in it.
CAPCOM Okay, get it on the way back Charlie.
DUKE These things are giving us more trouble than the whole. Hey John we'll save that one for rocks. I'll put the camera in this one.
YOUNG Okay. Okay, have you got - I'm going to get the shovel. Tony are you going to want a rake sample along the rim here?
YOUNG Yeah, let's do that.
DUKE No, let's go get the polarizer first and polarizing pictures and we'll do the sampling on the way back.
YOUNG This is about as far as I'd like to go. That's about 80 meters young.
DUKE Man are we dusty.
YOUNG Man I can't see the bottom of the crater though.
DUKE I know it. That's a shame. You see that big rock beyond John, Tony.

CAPCOM Yeah, we sure do, how about rolling that
one over.
DUKE Oh, no way.
CAPCOM And when you get to a convenient time
there we'd like an EV check.
DUKE Okay. Okay. Tony right under the upper
dull gray soil there's a layer of whitish material, much like it
was at South Ray.
CAPCOM Okay.
DUKE John go over and there's the shovel you
can use to pick that up with.
YOUNG Okay.
DUKE Okay I'm going to get the far field from
right here and I must have a 70 to 90 meter base, I'd say.
CAPCOM Good show.
DUKE Maybe only - let me move down a little
bit further.
YOUNG Okay, Charlie, don't back into nothing
now, you hear.
DUKE I'm watching where I'm going. Okay,
Houston I want to pick up a sample which I think is a black
type rock, but it is very dust covered. Okay, you're starting
the pan in the right position, Tony.
CAPCOM Okay.
DUKE From right to left.
YOUNG Oh, boy.
DUKE No, I was wrong it was a very friable,
very friable must be shot white rock with a lot of white
clast, 60 percent of the clasts in it are of the clast or
the matrices is consist - try that again - looks like about
50 percent of the rock is black glass, which was a lot more
than the rock I picked up and it sure is friable. You know
what I mean, it'll take a heck of a beating and that's going
into bag number 383. Hey Tony, the pan is complete in all
three syncs and I'm up to - I'm up to 80. Do you want a
500 from here also, Tony?
CAPCOM Right, sure do, you probably have 20 or
25 pictures left in that 500 so maybe that'll give you the
entire inside of the crater there. Why not just shoot up
the rest of the roll in there.
DUKE Okay. Okay.
CAPCOM And if you're through with your far field,
you can just throw that polarizer away.
DUKE I will in a minute. Okay, you wanted an
EMU check, flags are clear - I'm at 38 and intermediate -
about intermediate cooling.

END OF TAPE

DUKE It means about intermediate cooling.
CAPCOM Okay, and 02?
DUKE I think about 75 percent but it's so dusty
I can read it right now, Tony.
CAPCOM Okay.
YOUNG Yea, I can't see mine either, Houston.
DUKE Can ya'll see it down there.
CAPCOM Right. We've got about 67 percent.
YOUNG I'm in reading (garble) I'm in intermediate
cooling.
DUKE Okay. When you get dust on the RCU, you
can not read the 02 quantity.
CAPCOM Okay, you all doing fine down here.
DUKE Okay, Tony. Okay, Tony. I'm doing some
vertical stereo's of these rays coming out of the crater. Ah,
I'm out of film.
CAPCOM Okay. How much of the inside did you get?
DUKE Oh, I got 1 partial pan of about 3 quarters
of the way up of the entire wall, and then 2 ray, 2 vertical
almost 2 vertical rays.
CAPCOM Okay, we understand.
DUKE Before I ran out.
DUKE Guess what, John.
YOUNG What's that, Charlie.
DUKE My bags fell off somewhere.
YOUNG Well, I've got mine hooked over my little
finger. It won't fall off from there.
DUKE Look at this rock right here, John. Pure white.
DUKE Yea, it's really shocked what ever it is.
It looks like chalk, Tony, it's so shocked. It's about the
pebble size and it's broken open, let's make it 5 centimeters
long, broken open. John, could you bring me a - let me get
this one documented. Okay, the polarizing filters coming off,
I hope.
CAPCOM Okay, Charlie. And we'll just call that
the end of the 500 millimeter.
DUKE Okay. Sorry I ran out of film there. I
thought I had plenty.
CAPCOM Oh, that's all right.
DUKE Okay, Tony. I'm going back towards the
minimum cooling. I'm getting a little frosty.
CAPCOM Okay.
DUKE Okay, Houston. The black clasts in this rock
are really, really black material. It's either a very fine grained
black breccia I'll tell you what it looks like, it looks like
that black breccia, fine grained lined that had that white clasts
in it on Apollo 15. Although here, the matrix is white and
the glass are black.
CAPCOM Okay, understand. How large are the clasts?

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YOUNG You remember that one, Houston?
CAPCOM Rog, I remember. Is this black breccia
frosty too.
YOUNG 3 centimeters. No, it's not frosty at all.
It's dense.
CAPCOM Okay.
YOUNG It could be, it could be a very dense salt
like rock. It is - it's cleavage, I mean it looks like it has
the 90° cleavage, (garble) tell that. That's just the way it
breaks. But it's sure shocked. It's too big to go in the bag
but I'm going to put it in there anyway.
CAPCOM Okay.
YOUNG At least it has a shocked appearance.
YOUNG What did you do with the shovel, Charlie.
DUKE I got it. I'm sorry. I thought you weren't
using it. I was going to get this one over here.
YOUNG Okay.
DUKE Yea, I finally got the polarizing filter
off, Tony.
CAPCOM Okay.
DUKE Okay, looking back from where we are, Tony,
towards the west - south rather, I can see South Ray.
YOUNG I'd like to make sure we aren't overlooking
something here, Charlie.
DUKE That's why I'd like to go on down to that
black rock down there, John.
YOUNG Hey, the one you've really got your eye on.
I can tell.
DUKE Big one.
YOUNG Yea.
YOUNG Okay, here's a small secondary up here on top
of the, of the - of the rim. It's about a meter across, about
a meter deep and it has either very angular, very angular black
clasts or part of this black rock in total, and they must be,
they must be 4 or 5 centimeters across in there and I'll get
one or two of those babies.
DUKE Hey, John. Can I get a bag from you.
YOUNG Sure. Just an old one. You'll have to get the
shadow for scaling, Houston.
CAPCOM Okay.
DUKE Okay, Tony. I picked up that white -
YOUNG I'll get it for you.
DUKE Thank you. That white shocked rock. It's
broke into. There's two pieces of it. Partially documented
(garble) and 384.
CAPCOM Okay, bag 384.
DUKE And John, I'm going back and get some bags.

YOUNG Now, I've got Charlie's shovel for scale
for the proportion
YOUNG You can almost get local vertical on the
shovel because you have to balance it so it will stand up.
CAPCOM Okay.
CAPCOM Okay, Charlie. Did you bring the 500 millimeter
back with you.
DUKE See me coming?
CAPCOM No, we're pointed over at John.
DUKE Oh, okay. Hey, ya'll must really be zoomed
in then.
CAPCOM We sure are.
DUKE I'm just a few feet to the left of him.
DUKE Ya'll didn't see any bags fall off anywhere,
did you?
CAPCOM No, we didn't see them.
DUKE You'r big eye.
YOUNG That -
CAPCOM There we've got you, Charlie.
YOUNG rest of that rock is dust covered. It appears
to be a really black glass. It's going into 385.
CAPCOM Okay. 385.
DUKE I cant believe it. What a spectacular view,
looking back to the east and to the south, Tony. You can see
Baby Ray, way on past Kennesaw where there's a bright fresh
crater down there on it's flank. Okay, I need to get some more
bags, but I don't have a holder - my holder -
YOUNG What really attracts me to this rock, even
though it's dust covered, Houston, is the fact that, it the fact
that's it's has right angles to it. It did, before I picked it
up.
CAPCOM Right, remember those blocks up at Navada test
site, from the rim, they broke at right angles too.
YOUNG Yea, this next one that's going in, is so
dust covered after I picked it up and dropped it into the dirt,
I can't discribe it to you. Other than to say it's dust covered.
It's going into -

END OF TAPE

YOUNG (garble) after I picked it up and dropped into the dirt. I can't describe it to you on the same dust cover. It's going into bag 386.

CAPCOM Okay, 386.

DUKE Okay, Tony, the 500 is complete. What do you want me to do now?

CAPCOM Just go back and sample. We'd like the big boulders samples and look for that -- well, I guess, we're just boulder sampling now.

DUKE Okay. I'd like to go up to the southwest around the other direction from John and try my hand at these large white rocks.

YOUNG Charlie, do you want to drive the -- I don't think we can drive the Rover over to here.

DUKE No, I agree. That's not very much -- I was just going up here a little bit, John, and do some of the flight line stereo of this 3 meter block up here.

DUKE Tony, some of these places are -- rocks are glass covered. They are all fractured 30 feet uplooking.

CAPCOM That's fine, Charlie, if you want to go down that way.

DUKE Okay, I'm going --

YOUNG If you're going to boulder sample, Charlie, I'd better come and help you.

DUKE No, I'm just going to whack -- I'm not really going to do the true thing. I'll be down there to help you in a minute.

YOUNG Charlie, you want to go down this steep wall while we're down here?

DUKE I'd like to in a minute. I wanted to make sure we get this -- what this is -- I mean this is up here on these white rocks. I think you probably have it but --

CAPCOM John, how far away is that big boulder?

YOUNG It is about, near as I can tell, 150 meters but the rocks around it are really something else.

YOUNG That's the problem its draft capability up to it.

CAPCOM If you think you can work up there, it sounds like an awful good place to work.

CAPCOM Charlie, you dropped your bags.

DUKE I know it's empty. It didn't have a thing on it.

YOUNG There's an old glassy rock, Tony, that -- the glass coated we weighed it at one end to 415.

CAPCOM Okay, 415.

YOUNG And it was hackley looking on the

YOUNG surface that's why I stopped to get it.
CAPCOM Okay.
YOUNG Charlie, we could probably get a pretty
good cross section up here with just a rake sample.
DUKE Yeah, I agree.
DUKE Back here is a little crater right there
that was -- had uncovered some -- Okay, Tony, I'm going to
give you a little stereo on this boulder.
CAPCOM Okay, if you see any clouds or anything
into that closeup might look good.
DUKE That's what I'm going to do.
CAPCOM Okay.
YOUNG Boy, it's hot out here today. I'll tell
you. Want to give me a hand with this rake sample, Charlie,
or want me --
DUKE Yeah, if you'll standby just a minute,
John.
YOUNG Charlie described this boulder right
here to you, described this one with the black streak running
through it?
CAPCOM No.
YOUNG Boy, that is absolutely beautiful. It
has a black breccia pattern running right through the middle
of it. It's about 6 -- it looks like a subberry breccia
and that's the truth. I can't believe it.
CAPCOM Good, maybe you can get some of that.
CAPCOM And, Charlie, while you're up at that
boulder, if you can get some of that fillet as well as
the boulder?
DUKE Okay, I don't have anything to fill it with,
but we'll see.
CAPCOM Okay.
DUKE Be advised that -- just dropped the bags.
CAPCOM We saw.
YOUNG Tony, I think with these equipment
problems, we'd better work together and I'll handle one and
you handle the other bag and we'd be able to be more pro-
ductive, don't you?
DUKE Yeah. I guess you're right, John. What
do you think of these white rocks up here, John, that's got
a fracture on it, if you'll just let me --
YOUNG Got a hammer?
DUKE Yeah, I got the hammer. Why, if this is
loose, the stuff is lying up there on the top.
DUKE Hey, Tony, we'll fill it -- samples --
samples for you up here.

YOUNG Got a shovel?
DUKE Yeah I -- no, I don't have a shovel but I got a hammer.
YOUNG Now I'm going to -- I'll come up there and help you. We can do the rake sampling -- and make it --
CAPCOM Charlie, if possible, we'd like some samples on that stuff on top of the boulder.
DUKE Yeah.
CAPCOM I think that's what you're going to do there --
DUKE What I'm going to do -- that's what I'm going to do.
CAPCOM Good show. You're about 10 steps ahead of us.
DUKE I'm not going to give you any scale, though, it's just too -- with our problems here, like John said is --
CAPCOM That's okay if you bring it back that would be enough scale.
DUKE Okay. And it looks like the same thing that John had described. It's a friable breccia with a black glase being an anorthonetic. The largest glase I see is not in the sample but it's a black one that's centimeter across. It has a bluish tint to it, Tony. It looks like all those sharp rocks that Fred Hurst was telling us about. Exactly and that's in bag 4 -- wait a minute. 416.
CAPCOM Okay, 416. And from today, the experience and yesterday that sound like old Fred's briefings were pretty useful.
DUKE It turned out pretty good, I think.
YOUNG Charlie, put that in my bag.
DUKE Okay.
DUKE You don't have a bag. It fell off. I think both of them -- let's just use this one, okay? They want a fillet up here, John. Could we get a fillet up there where that gnomon is?
YOUNG I'll get the (garble).
DUKE I thought I'd use my little finger as a bag holder.
YOUNG Good.
DUKE Okay, that fillet is 417, Tony.
CAPCOM Okay, 417.
DUKE Huh?
YOUNG Okay, I'll get the NOUN from here.
DUKE Okay.
DUKE There's an after and I'll try to get a locator from up here.

YOUNG Did you get the boulder off the top?
DUKE Yes, I did. I got that sample.
YOUNG Okay, it's a bulgy rock breccia.
DUKE Boy, the matrix is the white, though,
Tony, with the black being the clase.
YOUNG Yeah, I see at least 2 different colors
of light-dark clase. They must be at least a 3 ricker
CAPCOM Good show. You feel like you got all
three?
YOUNG (garble) the rake sample, Charlie.
DUKE Okay, good idea, John.
YOUNG I can't imagine how they would be in the
class that -- probably picked up.

END OF TAPE

YOUNG Look at these rocks here, that I just stepped on.

DUKE Hey, John, I'm chipping out this little tiny, this big black clase here. It's coming right out. I don't think we got any of it in that sample that I got. And this thing is so friable. Hey, I got it.

CAPCOM Very good. While you're looking around up there, you might keep your eye out for a permanent shadow area and we'll go ahead and put it in the regular sample bag and forget the STSC's

DUKE Okay, Tony. This is a black clase I chipped out is amphonitic matrix, with - it looks like a basalt - typical basalt to me. And I'll show you - I got a picture of it after I chipped it out. I didn't think I was going to be able to, but it came out get a 5 footer crumb. This is going into 418.

CAPCOM Okay, 418. Sounds like a good one.

DUKE Can I put rock - I have a cleaner rock like that before in the Apollo samples.

CAPCOM Good show. Another first for 16.

DUKE Okay, Houston, I have a rock here that is a fine white crystalline rock. It's pretty well dust covered, but I don't see any clase in it.

CAPCOM Okay.

YOUNG Of course it could be just a hunk of matrix that got busted loose. But as fine as these clase are in it, according to bag 387, as fine as these rocks are, I don't see how you can miss one.

DUKE Sorry, we're working behind that big rock there Tony, from the tube, why don't we -

CAPCOM That's okay (garble)

DUKE Just anywhere we rake, we got a rake we got a good sample.

YOUNG Yes. Charlie, let's get a -

DUKE Dad gummit. Get what, John?

YOUNG Let's get a soil sample right here.

DUKE Okay.

YOUNG Here, take this.

DUKE I can get it with this. Okay, you want to document it?

YOUNG Yes, we can, but I don't really see much -

DUKE Boy, this equipment problem is really handicapping us. Okay, there's - wow, boy. The regolith here, Tony up on this crater rim is really soft. We're sinking in on the slopes about 6 inches or so.

YOUNG Okay, missed it. That's a good one.

DUKE Okay, the soil sample here out is 419, okay?

YOUNG Okay.
 DUKE That's good.
 YOUNG The rakes on here.
 DUKE Let's get in a clear spot, John, to rake,
 okay? Then we can do it down there too.
 YOUNG It looks almost fruitless up here.
 DUKE Oh no, there's some rock.
 YOUNG Lot of rocks there, Charlie, one rake
 sample.
 DUKE One rake sample right out here, Tony.
 CAPCOM Sounds good.
 DUKE You can see us on the tube.
 CAPCOM That's fine.
 DUKE It's going into 48, it's going in 420.
 CAPCOM Okay.
 YOUNG Just hold still.
 DUKE Oh, he's got some nice ones there.
 See what I'm doing, tThat's it.
 YOUNG Got them in there?
 DUKE Yes.
 YOUNG Amazing.
 DUKE They're so dust covered I can't really
 see what they are. I can't believe all those bags dropped
 off.
 DUKE Okay, where you want to go?
 YOUNG Going back to it.
 DUKE I got it, I got it, John.
 YOUNG Let me get it. Over there.
 DUKE Save some energy, it's hot out here.
 Hey give me my bag, I'm not carrying a bag. Got it.
 DUKE Okay, Tony. Why don't we go down half
 way, John and do another rake sample and then go down to
 the big black rock.
 YOUNG Alright.
 DUKE And that'll be about 150 meters radial -
 not radial, but concentric sampling. I'm on intermediate
 cooling now, Tony.
 CAPCOM Okay, we copy that.
 YOUNG I'm half way between.
 CAPCOM While you two are working together,
 you may be able to put the bag shoe into the core cap holder
 on the side of Charlies PLSS. You won't be able to run that
 way, but at least it'll be someplace to hang it when you're
 working.
 YOUNG Here, let me take this down and we'll
 get down in this little hollow - we might want to use some
 how's that for the rakeoff, okay.
 YOUNG Why don't you see if I can stick my bag
 in your holder like -

DUKE Won't be able to ride with it that way,
huh?

CAPCOM It'll probably pop out, but you can
look at it.

YOUNG I'll just keep it on my keep it over your -
push it way up on your finger, Yes, if I push it up on my middle
finger it ain't going to fall off, don't even know it's there.

CAPCOM Okay.

DUKE Then we'll get a down sun and a cross
sun here.

PAO The bag dispenser John Young and Charlie
Duke are carrying would normally be attached to their suits.

DUKE John, have I still got my SCB on my
back?

YOUNG Yep.

DUKE Okay.

YOUNG Come right down this way.

DUKE Okay, John's getting about 2 rakes,
he's doing 2 rakes and he's got about 15 pebbles.

YOUNG There's not any there.

DUKE That's a pretty good full sample. There
you go, look at that. That's a bag full now. The third
one was really fruitful.

YOUNG Okay, turn it. There you go. Hey, one
of them had - I could see breccials in one of them.

DUKE Yes, I could too. Okay, that's in 421,
Tony.

CAPCOM Okay, 421. And we'd like a soil here.

DUKE Okay, and give them a soil. My shopping
bag idea would have worked, John. Those things are sitting
right up - you just plop them down.

YOUNG Sure it would have worked, Charlie.
It's a good idea too.

DUKE Okay, 422 for the soil sample, Tony.

CAPCOM Okay.

DUKE That's enough, John. That's a hundred
grams.

YOUNG Okay. That's okay Another kilogram.

DUKE You mean in kilometers. Okay, get that
please, while I pick this bag up.

YOUNG It's a large number.

DUKE How's our time going, Tony?

CAPCOM Oh, you're doing really fine. We've
got an extension here, and you've got about 25 minutes.

END OF TAPE

DUKE How's our time going, Tony?
CAPCOM You're doing very fine, we've got an extension here and you've got about 25 minutes.
YOUNG Okay, Charlie, let's go back to the Rover. Put your bag on there and head out for the big rock, because you got a bag on your back, and we'll use it.
DUKE Okay.
CAPCOM We think that sounds like a great plan.
DUKE It isn't easy. Look at the size of that biggie.
YOUNG It is a biggie, isn't it. It may be further away than we think.
DUKE No, it's not very far. It's just right beyond you.
YOUNG Phonetically, huh?
DUKE Yes.
YOUNG Like everything else around here a couple of weeks later.
DUKE Okay. We got the -- you got the -- I got the shovel I guess the rakes best choice. And I got some bags --
YOUNG You got enough bags, I'll leave mine here.
DUKE Well, I've only got, I got about ten or so.
YOUNG Okay, that's how many I got.
DUKE Okay, bring yours too.
YOUNG A rake and a shovel, right?
DUKE No, not the shovel.
YOUNG Just the rake?
DUKE Yes, the rake is the best way.
YOUNG That's what I got.
DUKE Okay.
DUKE We'll stop about half way down here and do another rake, how's that?
YOUNG Looks like a good idea, Charlie.
DUKE Ah, the old footprints on the crater around.
YOUNG That's about half way, maybe. Okay, let me just stop this down here somewhere. Wow, I think we'd get a permanent shadow out of that big rock. Look at that fillet on this side, Charlie.
DUKE Okay, well we need the shovel for that.
YOUNG And, well, it's here.
DUKE Okay, yes, we can reach in there. I see what you mean.
YOUNG Okay.
DUKE Wait a minute, wait, wait wait. Don't know why I'm taking it downsun now that it's short in there.

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DUKE Okay, he's getting a couple of whitish frags and then dust-covered gray-lookings frags. I think you got a bag full there, John.

YOUNG Yep, three scoops and a bag full. It's all salted with that and one white rock here.

DUKE Super. Now, okay.

CAPCOM We agree, it's super.

DUKE Yes, that's in 423, Tony.

CAPCOM Okay, 423.

DUKE Okay.

YOUNG Hang onto this.

DUKE Yes sir.

YOUNG That's going, Charlie. S B then after that, John, I'll get to the soil sample.

YOUNG There's the after.

DUKE Okay.

DUKE Hey, it's hard under there, you know it.

YOUNG Yes, that's why the rake wouldn't go down.

YOUNG I'm not going anywhere. Hit it again.

DUKE Tony, there must be a big rock right under here.

YOUNG Yes. I can't get the rake in, but the -- now look at that, Charlie.

DUKE I know, it's all white under here.

YOUNG Yes.

DUKE Okay, Tony, down about a centimeter or less, it's all white.

CAPCOM Okay, you feel like that's a rock surface?

YOUNG I think it might be a rock surface and we're just in its little friable ones, the fractured ones, and we're just chipping off --

DUKE Here, John, I can get a soil sample from where you kicked it up with your foot. Ah boy.

YOUNG Okay, you want another one?

Hey, Houston, that soil sample is growing big.

DUKE 388, Tony.

CAPCOM Okay, 388. And we better press on for the big boulder.

DUKE Okay, we're headed that way. You get the tongs, John?

YOUNG Yes.

DUKE I'll carry the rake. Hey, Tony, my guess is that most of these rocks around here are extremely shocked.

YOUNG Yes.
DUKE All these in this area look the same.
Hope that thing is not --
YOUNG In the sunlight, Houston, this white rock has sort of a greenish hue to it, this white rock breccia. Which is what all this is we're walking on right now is this white rock breccia that Charlie chipped out of -- Charlie chipped out of -- and I guess this is probably the second layer up. I would reckon that this -- if we could see to the bottom, we could say for sure if this big black rock is right out of the bottom. But my guess from the old photograph it probably is.
CAPCOM Okay, that sounds like a good guess.
YOUNG See this rock right here, Charlie.
DUKE Look at the size of that rock.
CAPCOM We can see.
DUKE The closer I get to it, the bigger it is.
YOUNG Yes, but look at the permanent shadows part, Charlie.
DUKE On this side over here?
YOUNG Yes.
YOUNG No, right here on this one. See that shadow? That must be permanent.
DUKE No, I bet you it's not. The sun's going down over there, John.
YOUNG Yes, you're right.
DUKE See. If you come back here in two weeks, it'll be dark.
YOUNG Well, maybe a week and you'll have sun over there.
DUKE Okay, Tony, this is a very blocky area here.
YOUNG And look at those -- look at the shape of that rascal.
DUKE Yes. We don't see any glass, tho, particularly.
YOUNG No, I guess I'd have to call this a black matrix -- looks like the matrix has reversed itself now, it's all black matrix.
DUKE Well, Tony, that's your house rock right there.
CAPCOM Very good.
YOUNG Don't get too near the edge of that thing, it falls off. Look over at your right, it falls off pretty good.
DUKE Yes, I know.
YOUNG I'm just going to take a little stereo here. Okay, now we had to come down a pretty good slope to get to this rock, so we may have to leave early to get back.

DUKE Yes, I agree.
YOUNG You've got about 17 minutes before you have to drive off, so we'll have to hussel with this.
DUKE Okay, John, here's a -- lookie here. Can we quack with a -- see that, look at that. See it's glass coated and this is just fractured off. We could pull that off. Big chunks of that will come right off.
YOUNG Okay.
DUKE And it looks -- it's got a bluish tint to it, doesn't it?
YOUNG It does.
DUKE It doesn't look like the real basalt.
YOUNG Look at shadow coming right there, Charlie.
DUKE I'll be darned.
YOUNG It is. I'm sure.
DUKE Don't you know it at times up there I get a (garble)
YOUNG (garble)
DUKE Well, that settles that. Hey, move it down a little bit. That seattles that, doesn't it, Houston.
YOUNG Okay, got it.
DUKE Okay, here's the chunk out of the black rock looks -- some of it's glass-coated, Tony, and man, that is a shatter coned.
YOUNG Charlie, let's get the --
DUKE Okay, here you go. I got a piece. Give me a bag. Okay, on the next one how about stepping back and as I point to it, I'll pull off another piece and we'll put a couple of pieces in here.
YOUNG Okay.
DUKE And that's going in bag 389.
YOUNG Wait a minute, let me fold it up.
DUKE Okay, let's just take a picture of that. So you'll know where it came from.
CAPCOM Okay, we copy. 389.
DUKE It's badly shattered, Tony, so I don't know whether it's going to stay together or not.
YOUNG Get it, Charlie, I'll get hte picture, I really didn't --
DUKE That's right near the Shadow Cone. Ha, ha.
YOUNG Yes, I might expect as much.
DUKE Now don't worry about that.
DUKE Okay let's pour a little sample back and lets get it after.
YOUNG Okay.
DUKE Okay 5 samples in 389 Tony.

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CAPCOM Okay 389.
DUKE That's black. There's a faint -- look
at that veinlet running through --
YOUNG Yea.
DUKE Right there John.

END OF TAPE

DUKE It's black. There's a vein - look at that vein running through --

YOUNG Yea.

DUKE right there, John. (garble) Man, it's a big rock. Okay, Hohn. Here's this white stuff, here this, here's a rock John, that is not (garble)

YOUNG Yea.

DUKE and it's, and it's -

YOUNG (garble)

DUKE (garble) and it's a black rock. Look here. How about that.

YOUNG Better put that in your bag.

DUKE Okay.

YOUNG Put it back where, put it back where you got it for a second and let me get a picture of it.

DUKE Now, let's fit it in. No, just move away. They can fit it in.

YOUNG Okay, It that how it was more or less.

DUKE Yea, more or less.

YOUNG Okay, now get it. Let's get an after.

Yea, that has a class of that rock in it to.

DUKE Okay, that's - I wish we could partly stick that in the bag.

YOUNG We could take it in your bag.

DUKE Oh, okay. I need one of these so, cause they might break up. Okay, that's 424.

YOUNG No, it isn't going to break up.

DUKE It isn't, well, okay. Okay, Tony. That's in unbagged, and it's grapefruit size, and it was a white matrex. It's not as nearly shocked, and it's a large class about a 3 meter class out of this big black rock. Part of it.

YOUNG 3 meter?

DUKE No, this class is about 3 meters.

YOUNG 5 meters, Charlie.

DUKE Well, it goes from here all the way up to there.

YOUNG Oh, that's the one your talking about.

DUKE Yea. Did you get a stereo of that -

YOUNG Did you get a flight line of that.

DUKE Yea.

YOUNG Okay.

DUKE Okay, well, I got a pan of it. Okay, John, I'm going to wack off another - could you get a picture of this, where the hammer is. Let me get some of the unshocked white stuff.

YOUNG Wait a second.

YOUNG Oh, okay.

DUKE Got it.

YOUNG Yea.

YOUNG Hard isn't it.

DUKE Yea, it's hard, but I think I'm going to get a piece.

YOUNG I got it, Charlie.
 YOUNG Okay, here's a good piece here. Bag
 open.
 DUKE Okay, I've got it. Okay, Tony. Of the
 white clase with - it's not nearly as shocked, is going in
 425.
 CAPCOM (garble)
 CAPCOM Okay, bag 425.
 DUKE Okay, here another piece right there, John.
 YOUNG Okay.
 DUKE Here's another big piece right over here.
 CAPCOM Did ya'll see a permanently shadowed sample
 around there?
 YOUNG Nope, we don't.
 DUKE No. Sure don't.
 CAPCOM Okay, our best guess is that it should be
 on the south side if there's any.
 DUKE Oh.
 YOUNG Yea, we were over on the south side and
 we didn't see any.
 CAPCOM Okay, fine.
 YOUNG The hole unfortunately is a sort of a -
 it's sort of an east-west split there, Charlie.
 DUKE I know, it is an east-west split. Tony,
 we got an east-west split here, and we can get the rake in.
 CAPCOM Why don't you go ahead and take some soil
 out of that.
 DUKE Here John.
 YOUNG Okay. Put that in mine.
 DUKE How's our time good, going.
 CAPCOM Your going to have to leave after this
 sample.
 DUKE Okay, I was going to say, it's probably
 a long hike back up that hill.
 YOUNG In there or not, Charlie.
 DUKE Uh. Yea, I can get in here. Right up next
 to this rock right here would be a good point. I got it. Ha Ha.
 YOUNG In the bag, (garble). Okay. Wait a minute,
 I'll give you a little bit more. It's not a glass that you
 east-west split Houston, but it's one.
 CAPCOM Okay, fine.
 YOUNG Putting it in bag 390.
 CAPCOM Okay, bag 390. And we'll need a reference
 soil.
 YOUNG We'll need the tongs for a second.
 DUKE Okay.
 YOUNG (garble) go down there 5 meters and I don't
 want to do it.
 DUKE Okay.

DUKE There you go.
YOUNG Okay.
DUKE There you go.
YOUNG Okay.
DUKE I guess you ought to stick to tongs, and
we ought to document this.
YOUNG Okay.
DUKE I'll get - I'll just get a part. We'll
do a partial and then I'll do a cross sun of it.
YOUNG We ought to do a reference sample. Let's
get that huge mass right there.
DUKE Okay.
YOUNG The tongs are not going to go in this
ground, Charlie.
DUKE I know it. It's a big rock down there.
Why don't you just hold it down, and I'll take the picture.
Okay.
YOUNG Okay.
DUKE Click, click, okay. (garble)
YOUNG Got it, you got it.
DUKE Okay, Tony, this soil here is very hard,
and the rake really won't go into it. It's bending the tongs
like we use to in training.
CAPCOM Right, understand. If you can see anything
around there that's kind of loose and not in an east-west split,
kink of scoop some of that up, if you can't, we'll just have to
leave it.
YOUNG There's nothing loose.
DUKE Okay, there's about 25 grams.
CAPCOM Okay, that's fine. That's all I need.
DUKE Okay, got it.
YOUNG It's all Tony needs.
DUKE Do PI on this one, Tony.
YOUNG No. I said that's all they need.
DUKE Okay.
DUKE There's a real softy rock right there, John.
I want to throw that in.
YOUNG (garble)
DUKE Oh man -
YOUNG Can you hold this, Charlie.
DUKE What, the tongs.
YOUNG Yea. Just for a second.
DUKE Yea.
YOUNG Got to do that bag better.
DUKE Man, that rock had cracked just in the
right - okay, Tony, this large block is a very - the half - size
one, it's about 20 or 30 - 20 meters long, by maybe 10 meters
high, and it's a large (garble), got a gram sample going in 393
white matrex with glass on it, and it's -

YOUNG Don't backup anymore, Charlie.
DUKE I'm sorry. Lost my balance. It's got
some fractures in it that run -
YOUNG Your going back.
DUKE Okay.
CAPCOM Okay, and we'll have to start on back.
DUKE Okay, here - would you - here you go, here
you go, John. Here's your tongs. Would you pick up my bag and
let me move down to get a little bit stero and I'll be right
with you.
YOUNG Okay, let's go on back.
DUKE I am. I'll be right with you.
CAPCOM Did you see anything that you were pretty
confident was igneous?
DUKE Yea, this rock we - oh.
YOUNG An igneous rock.
DUKE Yea, if we would have brought the (garble)
bags, this right here is an igneous rock.
YOUNG The whole place looks igneous, Houston.
CAPCOM Were there any near the rover?
DUKE (garble) these large clase in it are igneous.
CAPCOM Rog. Which kind of bags (garble)
YOUNG Is that what you talking about volcan?
DUKE I'll take the bags. Can you get them out
with the tongs?
YOUNG Well, your going to have to hold that until
I get the tongs unloose.
DUKE Wait a minute.
YOUNG Hold the bag.
DUKE I'm trying to.
YOUNG I can't believe it.
DUKE We've got it. I can't either.
YOUNG Let's go.
DUKE Can ya'll see us all the way down here, Tony?
CAPCOM We're just seeing you now, when you were
around the corner there, we didn't see you.
YOUNG (garble)
YOUNG Take it easy, Charlie.
DUKE Sorry. Sorry we had to get down in here,
but that was a unique sample we thought, and -
YOUNG Okay, this big black rock, this big black
and white rock right here, that were just traversing by is also
the same kind of rock. Yea, and look at the size of it.
DUKE There all the same. There two rock types
here, Tony. That white matrex one, and then the black, the one
with the black.
YOUNG And in places there are the black and the
white for about 50-50 down here too.

END OF TAPE

DUKE white matrix one and then the black - the one with the black - and there are places where the black and the white are about 50-50 down here too.

YOUNG There are very few of those.

DUKE And it has the same character of the rocks us close that I would think that South Ray rocks had, when you look on the rim of that crater.

CAPCOM Okay, understand.

YOUNG Can we put those two rock bags on your seat Tony or do you have too much stuff in there now.

DUKE What did you say Ralph?

YOUNG Put those two rock bags under your seat?

DUKE Sure.

CAPCOM If you see a fist size igneous rock near the rover we'll use the pattern bags here, if not we'll just forget them.

DUKE Okay.

YOUNG Charlie there's your polarimetry thing.

DUKE And I took it off and threw it away.

DUKE It's going to be - I bet you all of this stuff up here is really shot, Houston. You want any that's - does that make any difference to you and therefore it's not going to be too hard.

CAPCOM Roger, understand. All right, if you find a good dense one that you think has a good hard surface on it we'll go ahead and take it.

YOUNG Take it, huh? Ready.

DUKE We'll we're pretty dust covered, I'll tell you what we'll pick one up and give it a try anyway.

CAPCOM Okay, that's the best we can do.

YOUNG I'm going to get one right here.

DUKE You would. Well, we're back. The old ticker is really pumping I bet you.

CAPCOM No, you're doing fine - got up to about 120 that's all.

DUKE Is that all?

CAPCOM Okay 128 exactly.

DUKE The old Orion's juice comes in great.

CAPCOM If you'd been exercising the last two days you'd be in better shape.

DUKE Anyway we wore the rope out on the exergerie.

YOUNG We didn't wear the rope out.

DUKE I was just teasing boss. John I hope you got the shovel. John, I ain't got the shovel.

YOUNG Didn't take it down there.

CAPCOM No, you didn't take it down.

YOUNG Where did we leave it?

CAPCOM Should be on the rover.
YOUNG Here it is on your seat.
DUKE Whew. Yeah it's on the rover.
YOUNG It'd be too big for a padded bag.
DUKE No, it'll go in.
YOUNG I think it's too big Charlie.
DUKE Well, let's give it a go. Okay, Tony
while we were gone we got a caution flag.
CAPCOM Okay, understand.
DUKE Something popped up -
DUKE I think it's the battery temp - number 2
is 135.
CAPCOM That's okay, when we drive off here we'll
put them all on battery 1.
DUKE Okay, now I'm going to put this stuff under -
there you go. Think that will go in there?
YOUNG Yeah, just push it in - that'll go in
there. A little big but it'll do it.
DUKE Why don't you put it in sig number 6 there
John. Now, let's see if I can find another one here.
YOUNG Okay, but get a smaller one Charlie.
DUKE I am.
CAPCOM Is one of you free there - we'd like to
switch out the mag in the back.
DUKE Okay, in about 2 seconds we'll be free
Tony.
CAPCOM Okay, good show.
DUKE I'll tell you this regolith is about an
inch deep here in most places. It's - there's just lots of
rocks under this stuff Tony. This is a Garble.
CAPCOM That's very interesting and I didn't
have that test.
DUKE GARBLE. Anyway you can barely get the
shovel in anywhere. Okay we got two rocks for your padded bags
but I'm not sure they are going to do you any good they are
so dust covered.
DUKE Okay, I hit one with the shovel here that
I've got in my hand that you just saw me pick up and it didn't
break anyway so at least it's that hard, if that's any
criteria. You want me to calibrate myself.
CAPCOM No, that's all right.
YOUNG Well, the velcro just came off that bag.
DUKE Okay what mag -- just give me a magazine
S on there, T or U, John, either one.
YOUNG T or U okay. It's T, Charlie.
DUKE Okay how about Zing this up for me?
YOUNG Okay, I'll do it.
DUKE I'll put the mag on.

YOUNG That's a better sized one.
DUKE That - guess what. Okay, I thought that
thing hadn't run Tony but the little ball had just stuck,
whew.
CAPCOM Okay, understand.
DUKE Oh, John -
CAPCOM What was it?
YOUNG The mag -- I did it, I'm sorry.
YOUNG Got it?
DUKE Got it okay.
YOUNG It's all ready up here, right?
DUKE It's funny how a little hammering fixes most
of the hardware.
CAPCOM And we want you back at F4 and 12 frames
per second.
DUKE I'd like it - okay, it's set and it's on
F4 now.
CAPCOM Okay, good show.
YOUNG Okay, Charlie, here's bag 6.
DUKE Okay, John both pattern bags are in there.
Okay, now Houston, the velcro came off both those bags and we
weren't able to put them tight like they are supposed to be.
CAPCOM Okay, we understand. And they go under
your seat, John.
DUKE He put them in an SCB, you don't want them
in an SCB.
DUKE No. They don't.
YOUNG I think with the velcro off of them you can't
hardly see them - I think we ought to leave them in the SCB.
If they get in there with the film we will be in trouble.
CAPCOM Okay, fine, just leave them in the
FTB.
YOUNG Good deal.
DUKE Okay.
YOUNG Okay, Charlie I'm going to close HTC.
DUKE Okay. They're right on the top there Tony
in number 6 and there's no rocks on top of them. I think
they'll be fine.
CAPCOM Okay, good show.
DUKE Hey, John, let me put number 7 on your -
try it again on your side.
YOUNG Charlie we're just going to lose it, why
don't just leave it under the seat.
DUKE I can't get it under my seat.
YOUNG See but it's full of nice things!
DUKE Okay and I'll hold it in my hand then.
I don't.

END OF TAPE

DUKE Sure got my hand in. Ooow.
YOUNG Want to see if you can put it on?
YOUNG Now that you moved away a little bit. Yeah -
DUKE Yeah. A little bit more. Okay, that's
fine.
YOUNG It's on there.
DUKE These things ought to have locks on them
like that -- like the little green locks like the ones on
the --
DUKE Hold still.
DUKE John, I'm I doing something to make you
move?
DUKE Okay, now it's stretched down. Tight.
YOUNG Got it, huh?
DUKE The velcro is tight but I ain't going to
guarantee anything.
YOUNG All right.
DUKE Okay, what's my mag count?
My mirrors are so dirty, I can't even see.
YOUNG It's 122, Charlie.
DUKE Okay. Let it go.
CAPCOM And John, what's yours?
YOUNG Mine is 102.
CAPCOM Okay.
YOUNG (garble).
YOUNG Good grab sample.
DUKE I thought you might get one.
DUKE Camera reset the caution flag?
YOUNG Okay.
DUKE Okay, frame count for (garble) we've
done and I think we've got enough pan. Did Stone, KIVA
North Ray.
YOUNG You turned off the tube.
DUKE Okay, you turn off the tube and I'll go
back to (garble). Hey, Houston, going to switch mode to
1.
CAPCOM Okay, fine.
CAPCOM And when you get ready to drive off
there, we'd like --
YOUNG (garble) VW.
DUKE I guess we're a little late --
CAPCOM Like the rear drive power to bus baker
and is steering the bus baker, rear steering.
YOUNG Okay, Charlie. You in?
DUKE (garble) You are not in - you are dirty
though
YOUNG There you go. I didn't think I was in.

DUKE I can always tell. Okay.
YOUNG Bus baker with the rear drive there?
DUKE And rear steering to bus baker.
DUKE Okay, Tony, one final comment here, again,
no impression of -- to me, anyway, of layering or bedrock --
just loose rocks in the walls and they're splayed out in
ray pattern.
YOUNG And that's some hole.
DUKE And there's about 1, 2, 3, 4, 5, 6, 7,
8, 9 rays coming out of there intermixed the red white and
black rocks in each of the ray and that's in about maybe a
half of the crater.
CAPCOM Okay, understand station 13 will
be right down your tracks about a half a kilometer and
we'd like you to stop in the mist of those big boulders that's
describe on the way up.
YOUNG Okay. My kind of station 13.
DUKE (garble) running?
CAPCOM Good show.
YOUNG Yeah, beat me to it.
DUKE There are your tracks. Look at that, John.
YOUNG How far.
DUKE See them back over there?
YOUNG Looks to me like we just around the circle
here, Charlie.
DUKE Yeah.
YOUNG Okay, station 13, right down the same
way we came. Oh, my goodness.
DUKE We can't see old Orion from here.
YOUNG This is going to be something going down
this hill.
YOUNG Are you sure we -- I'm not sure we came
up that hill.
DUKE Yeah, we did. There are the tracks.
YOUNG We sure come off it, didn't we?
DUKE Look at that slope.
DUKE Be sure that you got the brakes on.
Tony, this is at least 15 degrees slope we're going down and
that Rover came right up it and you never even knew it.
DUKE Brake -- John. Man, man that was
super. I should had the camera pointing forward. Hey, Tony,
that was at -- make it 179 at 4.4, that little steep slope
there. Whoever said this was the Cayley Plain?
YOUNG I went down the rim with the crater here.
We just set a new world speed record, Houston. 17 kilometers
an hour on the moon.
CAPCOM Let's not set anymore.

DUKE I'm with you. Okay, John, I got about
 2 hours and --
 CAPCOM 40 minutes.
 DUKE 40 minutes to the flight.
 YOUNG I guess that would be a new moon speed
 record, wouldn't it?
 DUKE Yeah.
 YOUNG I never thought about it.
 CAPCOM And all your --
 YOUNG Tony, going back across on --
 CAPCOM Okay.
 YOUNG Going back across on the tracks, we just
 barely penetrated the regolith maybe 1/8 of an inch or so.
 Whatever it is, it's going to be a firm and hopefull, we
 can in 13 a double core one.
 CAPCOM Negative. We'll have a double core back
 at the station 10 prime station.
 DUKE Oh good that's, I think we might do it
 there. Here, I don't think --
 CAPCOM Okay. Station 13 has a rake soil, then,
 a documented samples till you run out of time.
 YOUNG Okay, we'll go up on this ridge here,
 Charlie, cause that's where the big blocks were.
 DUKE Yeah.
 YOUNG Remember?
 DUKE Yeah. That big one we thought was the
 rim and it was --
 YOUNG Yeah.
 DUKE This ought to be -- what we're up on now
 is a sort of a pre-rim rim of this impact crater.
 YOUNG And it's 600 meters from the rim.
 DUKE Okay, Tony, I'm panning your camera
 around at various places here on a 16 to get right and left.
 It really -- again the impression is --
 CAPCOM It's probably out of film now.
 DUKE Already?
 CAPCOM No, we're just going to turn it off.
 I'm sorry, Charlie.
 YOUNG Turn around this way, Charlie, and I'll
 show you.
 YOUNG It's half full, Charlie.
 DUKE Okay, turning it off.
 CAPCOM Okay, good show.
 DUKE And it's hard on the old fingers.
 DUKE In fact, it's still running too.
 DUKE That's the Rover I hear feeling that
 thing vibrating.

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APOLLO 16 MISSION COMMENTARY 4/23/72 CST 12:00 GET 168:18 634/4

YOUNG Well, Charlie, here we go again.

DUKE It's remarkable, isn't it?

DUKE Tony, we just stopped for -- there's a --
no, it can't be that.

DUKE There's a big rock over there but this
other one is down at the bottom of this hill here, John.
We came by -- we just stopped another rise and we're looking
to the southeast across the -- towards the back -- towards
the Cone Plateau. It's an undulating surface and it indents
for about -- I guess -- it's difficult to judge distances.

YOUNG There's a big rock down here, Charlie.

DUKE That's him, yeah. But it's undulating til
it hits the scarps but I think I'd call it the Cone Plateau --
that's the scarp on the map that you can map around like a
little reentrant on the map back to the east. We can see
back up that way and all the way up to the top of the plateau.

CAPCOM Okay, and we won't want a NAV update of
Station 13 so you can park either north or south which ever
is easier for you.

DUKE Okay. We almost fun out on that one,
Babe. That was great.

YOUNG Okay, let's go by that -- see that big
rock over there? Maybe that's a firmly shadow one. Try it?

DUKE I don't think so, but we can go look.

DUKE Are you going to follow those tracks back?
We might find it.

END OF TAPE

YOUNG I don't think so, but we can go look.

DUKE You know, following our tracks back, we might find it, the SCC.

YOUNG That's right, that's what I'm thinking. It would be something that looks strange around here - that's it. Oh, man.

DUKE Hey, Tony on down this ridge, we're going down about - at least a 5 degree slope. We have one real delicate rock that we're just passing now at 3.8 at 181 - 183 and then we have another rock down here that's the same size that's about 3 meters across that has hardly any fillet. And that's the one we're going to stop by.

CAPCOM Okay, good show. And your -

DUKE Is that what John meant for (garble) thermal shadow?

CAPCOM And your cuff checklist doesn't show TV here, but we'd like you to go through a normal TV power up.

DUKE Okay. I don't think we'll be able to aline it here, I haven't had any trouble alining that thing though, in just about any position. If we park north we'll be in good shape for them.

YOUNG Let's do that.

DUKE Okay, be able to see that biggy.

DUKE That rock looks like that great big one we sampled up on the rim, John.

YOUNG Sure does.

DUKE That's good. I just don't think it's going to be thermally shadowed though.

YOUNG I don't either.

DUKE Tony, we're here, and I'm getting off and then I'll read you the readings when I can brush it off so I can see.

CAPCOM Okay, I understand.

DUKE This thing is covered with dirt.

CAPCOM The LCRU is heating up so we'd like a good job on those. You know we know you do it every time.

DUKE Needs dusting, bad. Okay, Tony. We're at 2358 184 6.5 3.8 50 110 off scale low off scale low bats of 120 135, rears off scale low on the left, right is 200. Okay forward is off scale low, left, right, 200.

CAPCOM Okay, we copy.

DUKE Now, I'm going to start a pan. Little bit more cooling here.

CAPCOM Okay, the plan here is a rake soil first together and after you've done that we'd like John to take an LPM and Charlie you can go sample.

DUKE Okay, let me get a pan first, okay.

CAPCOM Sounds good.

DUKE How does this look for the antenna point?

YOUNG Looks about right on to me.

DUKE Okay.

YOUNG But what's the signal strength?

PAO This is Apollo Control. The crew again pointing the high gain antenna and we expect to get approximately 20 minutes at this location, perhaps a little bit less, we're running just a little bit behind on the timeline. While we're waiting for the communications and the television to come back in we might also mention that Ken Mattingly, aboard the orbiting CSM, Casper, is preparing to do a plane change maneuver to put the spacecraft in the proper position for rendezvous and docking later with the lunar module. That maneuver is to be performed at 169 hours 17 minutes 39 seconds. It'll be on the next revolution and on the 49 revolution of the Moon. The maneuver will be performed with the Service Propulsion System Engine changing the velocity 124.7 feet per second, and it will be a 7 second burn at that Service Propulsion System Engine. Sounds as if the crew is starting to get the antenna alined, now.

DUKE Okay, back and center. Okay. Oh I know the pattern on the ground is a mirror reflecting. Boy. That faked me out. I thought we'd really found something, Tony.

CAPCOM How's that, Charlie? Hey we got a picture again.

DUKE How you reading, Tony?

CAPCOM Five by, Charlie.

DUKE Okay. We had a little trouble pointing the antenna. Hey Tony, this area here is on a - we're on a slope - about a 5 degree slope away from North Ray, and this big block that you'll see in a moment is downslope, filleted, predominately downslope here. The surrounding terrain is covered with - not covered but 10 percent with cobbles. It's very subdued on the meter sized craters, in fact, it's a very smooth plain, but on a slope. The rock types here appear to be the same as we sampled on the top, but we'll get you a rake soil out in front of this big boulder over here.

YOUNG We need to get the bags and stuff.

DUKE Okay, John. We both of us got bags on our backs so why don't we just take these little bags, okay?

YOUNG Okay.

YOUNG I'm getting tongs for a gnomon.

DUKE Okay, it's a good idea.

CAPCOM Okay, Charlie, if you could grab the bottom of the gnomon and the sheaf there, we could use

CAPCOM That for a core and photometric scale.
We won't have the level, but at least we'll get part of it.

YOUNG It would be good if there wasn't so
much igneous soil on it. When I have it we'll put it out
there.

CAPCOM Okay.

DUKE I can't believe it. Hey, John. See
those 4 or 5 little rocks right there?

YOUNG Yes.

DUKE Stick her down right there and let me.
I'm sort of turned around down here on my direction. I
think I'm facing this south is over this way. The Suns up
over Stone. I can't believe it.

YOUNG The sun is so high. Oh gnomon.

DUKE There's the downsun and we'll - up the
slope adroitly like a gizelle. Back to station 13, Tony,
it sure looks good.

CAPCOM Good show. And looks good here, too.

DUKE And the regolith.

YOUNG Get a bag for me, Charlie.

DUKE Okay.

DUKE Okay, there's some glass in there, a
black chip. In one rake we got about 10 little, and the
regolith here, Tony is - seems to be a little bit more
loosely compacted than up on the top.

YOUNG I can't get my gnomon in. That's okay.

DUKE Not very productive though, on the
small chips.

CAPCOM We'll just take what you've got.

YOUNG I bet if I'd rake upslope, I bet you
I'd get more.

END OF TAPE

YOUNG Okay here's some more.
YOUNG Okay, there's about 20 small rocks going
into to bag 343.
CAPCOM Okay, bag 343.
DUKE That's three scoop fulls Tony.
CAPCOM Good show.
DUKE Okay in the soil.
YOUNG Let me get another bag from you Charlie.
DUKE Okay.
PAO We'll be asking the crew to take another
magnetometer reading here.
DUKE Ah, the old suit. Wins every time. I can't
bend this beauty like we could on the training grounds.
YOUNG There it is, it hooked mine. Okay, that
looks like 2 scoopfuls going into bag 346.
DUKE Sack it.
CAPCOM Okay 346.
YOUNG Ah, isn't that beautiful. If it gets out
of there we'll call it Houdini.
CAPCOM And Charlie you might look around-
DUKE Houston, the big eyes looking right at the
big rock what do you think of that beauty?
CAPCOM That's exactly what we're looking at.
DUKE It looks small, John.
CAPCOM During the LPM we'd like you to hammer
on that rock a bit.
DUKE I'm going to hammer. I'll hammer chips
from corners.
CAPCOM Okay, good show.
DUKE That's what I had in mind.
CAPCOM And if you get a chance and it looks like
some soil right on the south side, kind of underneath -
might be permanently shadowed you might take some of those
and just put it in the bag.
DUKE All righty.
YOUNG Well, Houston, I didn't park too good to do
the LPM. If I go 45 feet from here I'm going to be in the middle
of a crater. Is that okay?
CAPCOM No pick out a fairly level - just go a
different direction.
DUKE Okay, you don't mind if I go out behind
the rover, for example.
CAPCOM No, that's fine.
YOUNG A little bit right angles to it.
DUKE John, is that where those bags that still got
the bracket on it - is it under your seat here?
YOUNG What?
DUKE The bags that had the brackets on them?

YOUNG Oh I think they were bounced out.
 DUKE No, yeah - here you go.
 CAPCOM Okay, if you're going out (garble)
 be a little careful on that cable - It'll be pulling a
 90 degrees now.
 YOUNG Okay, well I think I'll go out as far
 I'll go out south - east southeast.
 CAPCOM Okay, fine.
 YOUNG It's o ff to our starboard bow or something.
 DUKE Tony, we're about out of bags. Did we
 sample that much?
 CAPCOM Ah, you've been really packing them away.
 YOUNG Yeah, we've only lost one set of bags
 Charlie.
 YOUNG Okay, here we go. Well, we've got a few
 left here.
 DUKE Okay, I'm going to get on the sunlit side
 Tony, so I'll know what -- I'll know what I'm whacking on
 here. You know, Tony, that might be a permanently shadowed
 soil right in there. I think it is as a matter of fact.
 It'll pass.
 CAPCOM Good show, let's get one of it.
 DUKE I wish we had this -- okay, I'll do it.
 Phew! Hey, what's the sitting between here -- 250 at 56?
 Well, that should -- would that look in there?
 CAPCOM Let's try that.
 DUKE Yes sir, baby, that is -- that is a per-
 fect shadowed soil sample.
 CAPCOM O-U-T-standing!
 DUKE It is really perfect! John, you couldn't
 have picked a better rock!
 YOUNG You're kidding!
 DUKE No, it's really perfect. Just great!
 I have to get my visor up to see something. There. Man, I
 can't believe I'm going beauty. Well, I don't know how
 long that rock's been there, but that dirt has been shadowed
 ever since it's been there.
 CAPCOM Okay, that's what we want, Charlie!
 DUKE That's way -- I got it -- I got it from
 about a meter up under there, Tony.
 CAPCOM Good show.
 DUKE And I'm sorry, but it's going to have to
 go in a little ol' plastic bag here.
 CAPCOM That's okay.
 DUKE And it's number 426.
 CAPCOM Any chance getting soil underneath that
 now for the control?

DUKE Uh, underneath the shadow, you mean?
CAPCOM Right. Underneath where you just touched,
just dig deeper.
DUKE That way -- Yeah, let me tip my visor
down, that thing is bright! Get out of the Sun. Yeah,
I can get that for you. That's about 100 grams, Tony, maybe
200.
CAPCOM That's all we need.
DUKE Okay.
YOUNG Now, I forgot to turn that thing off be-
fore I left the Rover. I don't know how to turn it off.
Anyway it's on now about to freeze -- Okay, how long does it take it
to warm up, Tony?
CAPCOM We've getting that done.
YOUNG --back at the Rover.
DUKE Eh? Do it again?
CAPCOM Okay, we'll take a mark now, and go a
minute and a half, and I'll tell you when.
YOUNG Okay, you go -- get a picture of it.
DUKE That would have -- John, that shopping
bag would have been -- should have gone down to the super-
market and bought one.
YOUNG They give it to you at the supermarket.
DUKE See how that sample bag is --
YOUNG Yeah.
DUKE Is sittin' up there -- I mean the SCB
sittin' up there, Tony?
CAPCOM Yep, sure do.
DUKE What cha need -- looks like to me -- is
a bag like that has two handles on it --
YOUNG Can I help you Charlie? Let me put that
in the bag.
DUKE I got it.
YOUNG Okay.
DUKE That ain't very much, but we'll keep --
oh, just keep -- well, I got enough. Go ahead.
CAPCOM Okay, that'll be good on the soil sample
and we'd like to spend the rest of the time, and there isn't
much of it, hammering on that rock.
DUKE Okay, there's about 50 grams in the con-
trol.
CAPCOM That's fine.
YOUNG It's going into the bag 427.
CAPCOM Okay, 427.
YOUNG Bcy, it just might be permanently shadowed
Houston, because -- because it's downslope, and when the --
gollie --
DUKE I think it -- John, I reached back in

DUKE there about -- pull your visor up and
look under there. I pulled -- reached in there about 2 to
3 feet it looked like to me.

YOUNG Uh, that there is one of those gopher
holes.

DUKE Yeah.

CAPCOM Hey, John, can you push that one over?

DUKE Do that in West Texas -- No -- you do
that in West Texas and you get a rattle snake. Here you
get permanently shadowed soil.

YOUNG One thing about this rock is it has some --
this is the one that I noticed when we were coming up the
way that had some of these holes in it -- looked like vesicles,
Charlie.

DUKE Yep, they sure do, big ones -- biggies!
I'm out of film I think.

YOUNG Couldn't be (garble) hole.

DUKE Hey, John, --

END OF TAPE

DUKE (garbled) Now I'm out of film,
I think.
YOUNG Couldn't beat that for a hole.
DUKE Hey, John.
CAPCOM Okay, Charlie, we'd like magazine Foxtrot
on your camera.
DUKE Okay.
CAPCOM And John, you can do the LPM any time --
DUKE John, we're running out of --
YOUNG Okay, let me take a picture for you,
Charlie. Where at and how much?
DUKE No, that's okay. Look at this. Tony,
this is a black -- a black matrix with some excellent crystals
in and also that are milky in color. Don't see any cleavage
though or striations about a centimeter across and it has a
matrix of the white -- of that white rock like up on the rim --
not a matrix but some clasts of that.
YOUNG (garble).
DUKE Tony, say again the mag?
CAPCOM You'll need magazine Foxtrot and we're
about out of time here and we'd like to send --
DUKE Okay, Houston, (garble).
CAPCOM Okay, go ahead, John.
YOUNG I'll take the LPM readings. Okay,
161 711 117, 160 711 120, 160 712 117.
CAPCOM Okay, we copied that, John and visor
down.
YOUNG I didn't put it up. thank you. Read
switch off for -- five switches off.
CAPCOM Okay, Charlie, just get a couple of samples
there and you should be about ready to go, then, when John
gets that reeled up.
DUKE That's what I'm going to do.
YOUNG (garble) not here.
DUKE Okay, I got a couple of -- a handful of
chips there.
YOUNG See here -- Charlie, when you get under
the dirt, it's all white.
DUKE I know. Hey, 428, Tony.
CAPCOM Okay.
DUKE Great place to pick in. Two great places
to whack in. Oh, rats.
DUKE Well, John, I'm trapped.
YOUNG What do you mean?
DUKE I'm against this rock.
YOUNG You can't get up?
DUKE Well, I didn't want to fall down -- now

DUKE I got it. There we go. I'm sorry.
DUKE Give me a hand.
DUKE Now I'm okay, thanks.
DUKE Okay, Tony, I got three chips off of the
rock scattered over about a 2 meter area. One of them is
too big to go in the bag but the other -- the one is right
now going in 429.
CAPCOM Okay, 429, and we'd like you to go
back and start loading up.
DUKE Okay, I am.
DUKE Get this other rock.
DUKE That's swinging it really works.
DUKE John's got a long way to go, Tony
before he gets that thing reeled in.
YOUNG Charlie, Thanks for those words of
encouragement.
DUKE And, Tony, this rock here looks like
the same -- it's the same character as the one on the
rim.
CAPCOM Okay.
DUKE That great, huge black one that we sampled
except that we don't -- that one up there didn't have any
of these holes in it. I can't really say what these holes
are here.
DUKE They just look -- they're bugs -- Let's just
call them bugs. What caused them, I don't know.
YOUNG Yeah, they look more buggy to me although
they're round.
DUKE They look like drill holes is what they
look like.
YOUNG Yeah, that's right they look like - you
know what they look like? They look like those holes
you get in rocks where the -
DUKE Here, put those up for me.
YOUNG Okay, they look like the holes that you get in
rocks where you have a venting of gas that comes up through
there like along - you know what I mean, Tony.
CAPCOM Sure do, sure do.
DUKE Vesicle pipe.
YOUNG Yeah, vesicle pipe that's it.p
DUKE Vesicle pipes.
YOUNG There you go.
DUKE Okay, hi big eye.
CAPCOM Hi there Charlie.
DUKE Okay, let's see. Yeah. Okay, John, I'll turn
off the TV for you.
YOUNG Okay, let me put the scoop back.
Okay, going to one. This is a beautiful little piece of
gear.



CAPCOM Charlie, you've got about 4 minutes on the DAC at 12 frames per second and you can either use it that way or one frame per second either way you want. On the way back which ever looks best to you.

YOUNG Why don't we go at one frame a second all the way back to the rover?

DUKE (Garble).

YOUNG Huh?

DUKE What am I hung up on, John?

YOUNG Your bag is hung up, Charlie.

DUKE Oh, shoot you know that's probably why yours came off.

YOUNG Yeah, you got it. There you go.

DUKE Okay, is it free now.

YOUNG Only if you tighten it down. There you go.

CAPCOM And, we like your frames before you load up.

YOUNG Okay, get yours Charlie.

DUKE Okay, I'm 6 on magazine Foxtrot and I finished up.

YOUNG I'm a 112.

CAPCOM Okay.

YOUNG Big many that time.

DUKE Bcy, that Smoky Mountain.

YOUNG Make that 114, Houston.

DUKE That Smoky Mountain is a steep sided mountain, Tony. Ravine is - I got a good view of Ravine here and it's steep sided on the Smoky Mountain side, but it's very undulating on the other side on the Cayley side. And you can see Cat crater and it doesn't look very blocky so I guess it's probably, it's sharper than the rest but it's still no blocks around it.

YOUNG Okay, 1, 2. I didn't shut off the TV. Did you get it?

DUKE I did. I got it for you, yeah.

YOUNG (Garbled).

DUKE Yeah.

YOUNG Okay.

CAPCOM Charlie, if you haven't gotten on yet we'd like to change that to 12 frames evidently your DAC is about out of electrical power.

DUKE Okay, it's going at 12.

CAPCOM Okay, fine.

DUKE I'll start it when we get started, but it's on 12.

CAPCOM Good show.

END OF TAPE

DUKE I'll start it when we get started, but
it's on 12.
CAPCOM Good show.
DUKE F4.
CAPCOM Okay.
DUKE Oh boy, Tony. This has been a good traverse
up here. (garble)
CAPCOM It sure looked good down here, I'll tell
you.
DUKE It's spactular scenery.
CAPCOM I'm sure glad we got this EVA -
DUKE Hope we picked up the right rocks. I think
there are two predominant types. Yea, me too. I tell you two
perdominant type rocks here, the (garble) black looking ones
that really appear to be crystalline to me, and not necessarily
lava like.
YOUNG Okay, we're on our way, Houston.
CAPCOM Okay.
YOUNG And we're going to follow our tracks.
DUKE Where did you say station 10 is again.
CAPCOM Okay, station 10 makes a triangle with
ALSEP and the old station 10. We'll call it station 10 prime,
and it's about 50 meters to the northwest of the old 10.
YOUNG Okay.
PAO We estimate it will take them about 31
minutes to get back to station 10.
YOUNG Hang on.
DUKE Okay, I'll take the same set of pictures
coming back, Tony.
YOUNG Charlie, get you arm, you got -
DUKE Oh, excuse me.
DUKE That we took going out to get the different
sun angles. This taking pictures from the Rover here is really good.
The camera's just in the right position, Tony, so I hope they
will come out. Okay, off to the right we're at 3.7 186, off
to our right we have some more of the rounded rocks, whitish
in character.
YOUNG Yeah, so far on this trip my personal
estimation of Charlie's slope estimates that you can take
them and double, them everyone of them.
DUKE That was always my problem.
YOUNG Oh, good.
DUKE My 10 percent never added up to a hundred
John.
YOUNG You're not exaggerating here, I'll tell
you. You're sure under exaggerating.
DUKE Houston, this is the roughest terrain
to be plains I ever saw.

CAPCOM Seems we've heard that before on almost every geology trip.

YOUNG (Garble) it looked like this.

CAPCOM I don't think the photo geologists get close enough to their subjects.

DUKE Okay, we can - Tony, looking back now at 2:00 we're heading 140 1883.6 you can see End Crater right on the flank of Palmetto and you can see the rim of Dot. Palmetto is one of the highest features around and it's rim is really raised. I can see some large blocks on the north side of it that I couldn't see before. And I would estimate 2 meters or so in size.

DUKE Off to the right toward that -- which we described going out, now I can see 4, 5 2 meter boulders whitish in color with no fillets around them.

CAPCOM Okay.

DUKE I guess we would be off the ejecta blanket here, wouldn't you say, John?

YOUNG Yeah.

DUKE This is probably right in between the North and South Ray ejecta because it - there is hardly any pebbles, almost completely smooth surface, maybe 2 percent, Tony, with cobbles up to 5 centimeters. An occasional 20 meter - 20 centimeter block.

CAPCOM As that sun gets higher, it must be like looking at that zero phase everywhere.

YOUNG Naw, the visibility gets pretty good at high sun angle. It's still bad going into the Sun and into the Sun. But it's pretty good the way we're going right now. Want to take a picture into Palmetto, Charlie?

DUKE If we can get in there, I'd like to. Yeah, go up by Dot.

YOUNG Okay.

DUKE That's going to be a pretty steep slope though.

YOUNG Well, I'll tell you what. We'll go up there and do a 360 pan. How will that be.

DUKE Okay.

DUKE I'll do just 1 frame setting. It'll be a little off on exposure but - we'll see what it looks like.

YOUNG Developed a new technique for panning, Houston, 360 degrees on the Rover. Clicking away. That ought to make stereo for you.

DUKE Yeah, we look like we're in a - old-secondary area now, Tony, at 191 3.1 -

YOUNG I think this is South Ray.

DUKE You do?

YOUNG Yeah.

DUKE Took -- yeah, you're probably right.
YOUNG A big hunk of South Ray. Right? Same rocks and everything.
YOUNG And we're traversing it right now. It's a big rough - big old blanket full of South Ray material.
DUKE Look at those big rocks up on the - off to the west, John, up on the - you probably can't see 'em, but they're about 10 - stand out starkly against -
YOUNG Yep. Yep.
DUKE - the skyline on the far ridge.
YOUNG Yeah.
DUKE How far that is -
YOUNG Yeah, there's one of those black rocks like we got out of South Ray. That's a couple of meters black rock. Houston, now we've talked about that one when we passed by the first time. That's the same rock that we saw on the rim. That's the same class of rock, I would think, that we - that was that big house rock.
CAPCOM Hey, incidently we reduced the magnetometer reading now and it's 313 gamma's down, which is by far the strongest reading we've seen on the Moon. And dac--
YOUNG Golly! I know what that -- guess we're out of power.
YOUNG Well, I wouldn't be surprised that what a big impact crater wouldn't change your magnetic field some.
DUKE Tony, my impression right now could be proved totally wrong on the sample rea-- analysis but --
YOUNG Are we up on the rim of Palmetto?
DUKE No, we got a long way to go yet.
YOUNG Oh, yeah, there it is.
DUKE See there is Dot. I mean--
YOUNG Oh, yeah, yeah.
DUKE Dot's the white spot up on the top there, John.
YOUNG Yeah.
DUKE Ah, is that - I've seen the same characteristics of South Ray rocks as North Ray rocks being the black and the white. The streaks up the side of the craters are - are basically the same. The North Ray you got to guess at it a little bit more and that might be totally what my guess is. It could be wrong, but -- I think -- I kinda think they're at least similar rock.
YOUNG That stumped 'em.
DUKE So crazy, they didn't even answer me.
DUKE Houston, do you read? Over.
CAPCOM Ah, we sure do. Sorry, Charlie.
We copy that.
DUKE Okay, fine.

DUKE It's okay.
CAPCOM It was just mind boggle as Fredo says here.
YOUNG Sure is. I'll tell you one thing.
DUKE Yeah, I think you - I think we could make
it up over there, John, if you broke right here, but, I guess
you want to follow the old track. We're pretty close to the
rim there one time.
YOUNG Yeah, we'll get there.
DUKE We know this way works.
YOUNG Well let's not, let's not do any R and D.
YOUNG unnecessarily, that is.
DUKE But, Tony, if we sample one of these very
fresh crater with the indurated regolith to me look like they're
maybe of the freshest things around. Can you all date that with
the - just from the regolith that is -- the glassy charge or
whatever is in there?
CAPCOM Now, say again, Charlie?
YOUNG Not hearing, huh?
DUKE I's just asking a question about whether
you could date the - a fresh crater that has an indurated -
with an indurated regolith?
CAPCOM Ah, we'll work on an answer on that. I
don't know off hand.
DUKE Okay, there's a lot of them around the
rim and I'd like to at least pick up some of that and see
what you all could do with it.
CAPCOM That sounds like a good idea. We've got a
definite maybe from the back room there.
DUKE Okay, and, Tony, we're looking into End
Crater and it's a blocky crater. There's blocks inside of
it and there's some on the rim, half meter size. And maybe 10
to 20, naw let's make it-
CAPCOM Right, and you're asking about a stop.
We don't want to stop. We want to go on to 10 prime.
DUKE Naw, we weren't talking about a stop. I
was just describing End Crater there. It is a blocky rim
crater.
CAPCOM Okay, fine.
DUKE That - as we suspected.
YOUNG How do you like this, Charlie?
DUKE That's great.
YOUNG We're doing 14 clicks.
DUKE This is smooth going.

END OF TAPE

YOUNG How do you like this, Charlie?
DUKE It's great.
YOUNG We're doing 14 clicks.
DUKE This is smooth going. Boy, that rear wheel fender not having that fender really sprays it up there over you and -
CAPCOM Could we have an amp -
DUKE Tony, when we hit a big bump - 40 - about between 30 and 40.
CAPCOM Okay.
DUKE When we hit a bump, Tony, and bounce down, that rear wheel that lost the fender, showers dirt all over the front of us, and that's what gets the LCRU and the camera so dirty.
CAPCOM Okay, we copy that.
DUKE You earned your drivers license on this thing, John, I tell you.
CAPCOM (garble)
DUKE It takes just about any terrain. It's really a remarkable machine.
YOUNG Sure is climbing a slope right now, Charlie. We're only doing -- got a B max and we're only doing 8 clicks. So you know know this is got to be steep.
DUKE We're pulling a little over 40 AMPS, Tony.
CAPCOM Okay.
PAO They've got about 20 minutes of driving time left.
DUKE Somebody tell Ken, how dirty we are.
YOUNG Yeah, he won't let us in the hatch.
DUKE I know it. Okay, Tony, a -- we're at N -- just passing N crater and the rocks appear to be the same as we sampled. In texture, they may be not as shocked, as the ones up on the rim. I could grab you one in about a minute.
CAPCOM No we better press on.
DUKE Lets go over and look at the rim, John, here.
YOUNG Okay.
CAPCOM Incidentally we were able to track you in the Rover on the way out with the TSE and their able to see you now on the way back with the active siesmic geophones. We'd like to be sure that you are in the same tracks you were going out.
YOUNG That's true.
CAPCOM Okay.
YOUNG True that's true.
DUKE And we're at 192 at 1.9. Hey, John, right babe look at that. Hook a right please, get this old-- picture

DUKE Hey, Tony, we're going to drive over to the rim of Palmetto, which is a pretty good sight.

CAPCOM Okay.

DUKE And we see some blocks on the inner rim, but nothing that really appears to be outcropped and it's really a deep crater, Tony. It's --

YOUNG Don't see the bottom.

DUKE We can't see the bottom and we're right on the rim. It must be a 100 meters or so deep.

YOUNG Pictures of it, Charlie?

DUKE No I didn't get it, I thought we were going to do a 13 18 --

YOUNG Okay, here we go.

DUKE Okay. Okay, starting now, click -- click-- click -- click -- click -- click -- Okay that's about a 4 shoter, it might not be completely overlapped, but I think it will be good enough.

YOUNG Okay.

DUKE Okay, we're heading out, Tony.

CAPCOM Okay.

DUKE And the rim here is cobblely, I wouldn't say it's blocky, but it's cobblely.

YOUNG I think we've been averaging 11 kilometers, Houston.

CAPCOM Okay.

DUKE Look at that view back towards South Ray, isn't that spectacular?

CAPCOM Looking ahead of the tracks could you tell when you picked up the softer regolith? On the tracks that you came out?

DUKE They've all looked the same, haven't they to you, John?

YOUNG Softer regolith coming out from the LM?

CAPCOM Right, you mentioned up on North Ray

YOUNG (garble), Charlie.

CAPCOM that you only went in an 8th of an inch or so.

DUKE The regolith does change character right past the LM.

YOUNG And it's a lot less blocky, you know? I think this Ray right here --

DUKE I think this is probably E Ray, yeah.

DUKE Either that or it came out of Palmetto.

YOUNG This would have been a good choice for a rocky traverse. See over there in the west -- over there in that far rim over there, don't you see something looks like -- down in that ledge down there.

DUKE Yes there are 2 spots over there that might be outcrop, Tony. There's a --

YOUNG Oh, that's probably a secondary or something

YOUNG that's probably a big rock clop Charlie.
DUKE From North Ray,
YOUNG Yeah, that's what it is.
DUKE I don't --
YOUNG Just get in there --
DUKE There's one farther around though on the southwest rim, John, that sticks out like it's eroded away from underneath it.
YOUNG Yeah.
DUKE That has a hint of bedrock, but it's -- and that's about on the southwest rim -- about 20% down from the upper rim of Palmetto, Tony.
CAPCOM Okay, we copy that.
DUKE But it's just one little isolated block and I don't really think it means much. Still can't see the LM, we're on the --
YOUNG See South Ray, though, get a picture.
DUKE I'm getting them as fast as I can pull the trigger. We thought we'd be able to see the rim from here, Tony, but we're -- you can't do it -- I mean the LM but you can't do it. This thing says 194 or 1.4 I bet you that's right. We came farther east.
YOUNG Yeah, we're way east.
DUKE Yeah, Okay, Tony, between Gator and Palmetto
YOUNG Uh, oh.
DUKE Uh, oh. Ah, we missed it.
YOUNG Ahh, good suspension.
DUKE Yeah.
CAPCOM Well we're all holding on to our chairs.
DUKE Between Gator and Palmetto, we almost hit a great big rock, but old Percy here avoided it. Look at that 194, John, takes us right on our track. Between Gator and Palmetto Tony, there's a swail a depression that runs east west that is apparently more cratered than and a lot fresher crater there than what we been driving on between Palmetto and North Ray.
CAPCOM Ah, Roger.
YOUNG I just finished my 2 pounds of potassium.
DUKE You finished you 2 pounds already?
YOUNG Yeah, I don't know whether I'm driving or sloshing.
CAPCOM (laughter) Okay, we copy that.
DUKE Well at least I'm going stable with a fuel slosh pump.
YOUNG That's right, my fuel slosh problem is getting to be something fierce.
CAPCOM And the Command module just did their plane change burn and it's a good burn.
DUKE Good.
YOUNG Go.

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YOUNG Now you old fink.
DUKE Man, we are showered.
YOUNG Yeah.

END OF TAPE

YOUNG How many gammas did you say that LSM was,
Tony, 300 and some?
CAPCOM 313.
YOUNG How many times higher than that - that's
ten times higher than what the Apollo 12 guys got isn't it?
CAPCOM Ah, no, it's not that much greater, it's about
100 more than they got on Apollo 14.
YOUNG Yeah, that's what I thought. Well the
magnetic field of the Moon in places is a lot more than
anybody ever believed it would be.
CAPCOM That's right. From lunar orbit it
only looks like - from high lunar orbit, it only looks like
2 or 3 gamma at most.
DUKE John, that looks like an endogenic
crater right over there to me.
YOUNG Which one?
DUKE Off at 2 o'clock. It has no rim to
it -
YOUNG Can't see too good - yeah I see what you're
saying there -
DUKE See what I'm saying -
YOUNG Looks like a sink hole type.
DUKE Looks like a sink hole, big doodle
bug hole.
DUKE And that's Tony at our 2 o'clock and we're
presently at 9/10ths at 198.
CAPCOM Rog, we know exactly which one you're
talking about.
DUKE It's only about 100 meters or so from
us.
CAPCOM Is it on top of a little dome?
YOUNG Yeah we are.
DUKE Yeah we are.
CAPCOM Okay, understand.
DUKE That crater - that crater I'm -
yaahoo! Boy --
CAPCOM You left the ground again.
DUKE No, we almost - we spunout on my side.
YOUNG Thats it we're going -
DUKE Tony that's - this crater is about, I'd
say at least 200 meters across, has no rim and no blocks
associated with it, except for rays.
CAPCOM Okay, we copy that.
DUKE Do we do a three -
YOUNG How about right here.
DUKE Yeah, that's great.
DUKE A 902 70, either one.
DUKE Make it about 115 270, little bit
further right, John, that's good; now you can go back.
YOUNG Okay, here we go,
DUKE Got It - I've got it, okay?

DUKE There now there is a fresh crater with glass right in the bottom of that little fresh crater right back there. Meter size.

YOUNG (Garble) at 7/10ths and 198 at 7/10ths is the crater that Charlie's talking about.

CAPCOM Okay, we copy.

YOUNG And that's not on the map either. It doesn't even show up. I guess - I guess my opinion of this place is that on our - on our traverse maps the rimless features the very low subdued rimless craters, they just don't even show up, and there just not there hardly.

DUKE Right.

YOUNG And unless we've got a raised rim, they don't measure it, they don't show up in photography apparently.

DUKE Tony, that cinco, or whatever it was subdued crater we passed back there, is really deep, I'm surprised - I really don't have a map right here with me but it was probably 20 - 40 meters deep or so.

CAPCOM Right, we've got it on the map right here.

DUKE We couldn't see the bottom of it.

YOUNG This is an absolutely great suspension system Houston, you've should see some of the things we've run through and this baby just bounces right out and keeps right on going.

DUKE NAV is 196 at .5, we ought to see the old beauty when we top this rise here. John just ran over a basketball size rock with the right wheel and just - there she is John.

CAPCOM Well, that's good news.

DUKE We're about on top of a ridge maybe 30 meters - maybe 30 meters above and that NAV system has us pointed right at the lunar module. Look at that.

YOUNG Okay, Charlie.

DUKE Okay, it's 4/10ths. We're about 20 meters up, 30 meters up above it, Tony.

CAPCOM Okay. If you can recognize an edge of the ray, in the neighborhood of 50 meters, North of the ALSEP area, that would be a good place to fix station 10 Prime. Our photo shows the edge of the ray in there.

YOUNG This would be a good place to look for it from, Charlie, is right up here.

DUKE Does he want to pick a ray?

YOUNG Pick the edge of a ray, 50 meters or so north of an ALSEP site- of the ALSEP.

YOUNG Don't ask that - I just don't - you can't hardly tell where one - they're not as distinct - the gradational pattern is just too gradual.

CAPCOM Okay, we sure understand and just pick a place 50 meters, north and we'll call that 10 prime.

YOUNG Okay.

DUKE Tony, we must be out of battery power

DUKE because this camera - the DAK stopped running.

CAPCOM Okay, understand.

DUKE - there's 50 percent of the mag left.

CAPCOM Okay that's fine. I guess our calculations were right.

DUKE Okay, John let me get a picture of that. That is beautiful.

DUKE Another picture? Okay.

DUKE Back a little bit. I can't believe that big hole there, I just can't believe it right behind us.

YOUNG It might be -

DUKE Hook a right, John, let me get another picture while we're running. There we go. Might be what, John?

DUKE You know that might be an end of a ray right there, see that it's almost a blockless feature -

DUKE That might just be due to the downflow though. Don't run into that hole.

YOUNG Okay, Charlie.

DUKE Home again, home again, jiggety jig 50 meters.

YOUNG Where do you want to park this thing Houston, 50 meters from the -

DUKE Northeast -

DUKE Northwest -

CAPCOM Rog,

DUKE Just up over this little ridge here.

YOUNG Right by that big rock.

CAPCOM Okay, we're looking for in a sampling here those vesicular basalts that you both described in the area.

CAPCOM And also we --

- DUKE Okay that might be one over there, John, it's the pollution.

CAPCOM And to make a triangle with the other double core and the deep core.

YOUNG (garble) heading 180?

DUKE Yeah or north, I can -- either way.

DUKE Man, that's a beautiful site.

DUKE Okay, Tony we're stopped and we're just about directly north of the ALSEP.

CAPCOM Okay, copy that.

DUKE Oh, come out foot, there we go. Okay if wait a minute and I'll give you the Rover readings when I dust things off.

CAPCOM Okay.

DUKE Okay we're 180 188 11.1 .1 30

END OF TAPE

YOUNG Come out foot, there we go.
PAO This is Apollo control we're estimating about 15 to 20 minutes at this site.
DUKE He's off.
CAPCOM Okay.
DUKE Okay, we're in 180 188 11.1 .1 30 120 off scale low, off scale low on the amps. BAT temps looks like we had a failure on BAT temp 1, dilly up off scale low, let me whack it once, nope BAT 2 is 140, left - left front is 225, 210 right front and 225.
CAPCOM Okay, Charlie. Hey Charlie.
DUKE Okay, and I'm starting out with frame count 80, magazine Foxtrot. You want me to get a pan, Tony.
CAPCOM Yeah, pan will be good. And after that we'll go on with raked soil at this site. -
DUKE (Garble).
CAPCOM - after that we'll go on with raked soil at this site.
YOUNG Charlie, where is the earth? Should be right straight up.
DUKE Nope, not quite.
PAO John Young is trying to get the high gain antenna pointed so we can get television and you heard, also, the report from capcom Tony England that the command modules orbit plane change maneuver performed at the start of its 49th revolution just after acquisition was almost perfect.
DUKE Right, now down a little bit. That ought to be it.
YOUNG That's it.
DUKE That's 435.
CAPCOM Okay.
DUKE See the site?
YOUNG Yeah, man is it -
CAPCOM Okay, and when you're on the console there - okay and when your on the console there could you tap that amp-hour meter and see if you can get that lower one to come up some.
DUKE I banged the control panel hard, Tony, and nothing - none of the meters changed.
CAPCOM Okay.
YOUNG Uh oh.
DUKE What happened, John? Did you get the -
YOUNG (Garble).
DUKE Boy in training never would stay on - it wouldn't stay on.
YOUNG There, okay.
DUKE Hey, you moved the antenna, John.
CAPCOM Alright, we lost the picture. We lost the picture.

DUKE Let's stow it, John.
 YOUNG Okay, just a minute. I'm halfway through
 a pan here. Take me just a second.
 YOUNG Okay, here I come.
 DUKE No, you've got it pointed up too straight.
 Okay, it needs to come left, left - more left, more, more,
 okay now down just a scouch. Now left.
 CAPCOM That's beautiful.
 DUKE Okay.
 YOUNG That's very good till it gets near the
 center - such a shrimp I can't - can't get my hand up in there.
 DUKE Tony, a double core here too?
 CAPCOM Right, we'll need a double core.
 DUKE You cut out, say again.
 CAPCOM Yes we would -
 DUKE You cut out, say again.
 CAPCOM Yes, we would like a double core. The
 raked soil is highest - first priority and then the double core.
 DUKE Okay.
 YOUNG Hit your eyeball there.
 DUKE Huh? Oh.
 YOUNG Okay, the velcro on the side - the glue
 on the velcro on the sunshield is - whatever it does. It's
 probably the same glue you used on the standard bags because
 they came loose too.
 CAPCOM Okay.
 YOUNG You want this sunshield on there or do
 you want us to take it off and throw it away.
 CAPCOM Well, if it's doing any good at all let's
 just leave it on it doesn't seem to be in the picture.
 YOUNG Okay..
 YOUNG Yeah, I'm going to put the dust brush
 under my seat I don't want to go through that again.
 DUKE Oh rats, I dropped -
 YOUNG I'll come help you Charlie.
 DUKE Dropped a gnomon right where I wanted to
 sample.
 YOUNG There we go.
 DUKE The big eye is looking the wrong way.
 Boy, I just can't see anything when I get this camera in my
 shadow.
 YOUNG That's a good place, Charlie.
 DUKE There's the down-sun, a four half eight, cross-
 sun.
 DUKE How long is this stop, Tony.
 CAPCOM Okay, this is a 30 minute stop.
 DUKE Okay.
 YOUNG Home again, home again.
 DUKE Look at that - that regolith. We've got
 some glass coated frags here, Tony.
 CAPCOM Okay.

DUKE The raked. I don't see anything that looks -
YOUNG Get another.
DUKE Okay, that was about half a bag full.
One scoop.
YOUNG Bag full. Alright, uh oh, uh oh.
DUKE Okay, Tony, out of that scoop we lost the
two biggest rocks. I poured too fast.
YOUNG I didn't bag fast enough, Charlie.
DUKE They just don't stop in this gravity field
once they get moving. Okay, there we go, John.
YOUNG Hold the bags for a second.
DUKE Yeah. I got bags on my camera here we
could have used.
YOUNG Okay, that's in bag number 347.
CAPCOM Okay, bag 347.
DUKE Okay, get an after, John.
YOUNG I'll get it. Okay.
DUKE Ester - oh ester.
CAPCOM Right, we're going to want a raked soil,
over in the area of the old station 10, also. So it's up to
you whether it's easiest to go get it now or to get the double
core now. After, your through with this one.
YOUNG Let's get the soil, Charlie.
DUKE We'll get the soil. Okay, we'll - I
think it would be easier to go get it John because I've got
to take - to do the double core -
YOUNG Right, I agree with you.
DUKE - I've got to take this thing apart.
CAPCOM That's a good idea. And then you won't
need the raked anymore.
DUKE Yep. Okay, there's a scoop.
YOUNG Okay, and that's going into bag 348, 348.
CAPCOM Okay, 348.
DUKE That's just right over the ridge there,
about 50 meters isn't it?
CAPCOM Should be.
DUKE At old station 10.
YOUNG Yeah.
DUKE Ah, the old (garbled). Okay, get an after
of that John, and scoop.

END OF TAPE

DUKE How about swapping, I'll bag and you rest,
 YOUNG Okay, I'll get the gnomon.
 YOUNG Why don't you let me get the gnomon, I'll
 drop it over there, cause I can get down a lot easier.
 DUKE Okay, go ahead.
 DUKE Oh, got it.
 YOUNG It didn't ----
 YOUNG Ahh, the old (garble)
 CAPCOM He got that down to you, John.
 YOUNG That was -- yeah, look at these neat little
 craters, you just run right through them.
 YOUNG There's a lot of tracks around there, Charlie.
 That must be the whole station 10 right there.
 DUKE It's right over here, it is, yeah.
 DUKE This is where we took the double.
 DUKE Do you want it where we had the double core,
 Tony?
 CAPCOM Say again, Charlie.
 CAPCOM The double core will be at this rake site,
 ah, but while you've got the rake out there we might as well
 get the rake at the old double core.
 DUKE No, I mean -- that's what I'm saying. This
 is the old double core site, we'll rake here.
 CAPCOM That's exactly what we want.
 DUKE Okay, we're within three meters of it.
 YOUNG Be a good place.
 DUKE Yeah. I think any of these places is a
 good place around here. on the ole ---
 YOUNG That's a beautiful vehicle.
 DUKE Downsun.
 YOUNG Huh?
 YOUNG Okay, you locating it, Charlie?
 DUKE Yeah. Orion. Oh. Okay, we're sacking
 it 349.
 CAPCOM Okay, bag 349.
 DUKE Not bad, John's got 2 scoops--2 rakes full.
 Not nearly as productive over here.
 CAPCOM Okay, you're probably on a different part
 of the Ray, then, that's good.
 YOUNG It is, huh?
 DUKE 2 scoops and we got 3 little frags. 1 of
 them just dropped out.
 YOUNG 3 is all we got?
 DUKE 2, 1 of them dropped out.
 YOUNG Oh, That ain't very good.
 DUKE That was a (garble)
 YOUNG Heres a couple more.
 DUKE Okay.
 YOUNG Okay, let me get 1 more, Charlie.
 DUKE Okay.

DUKE (laughter)
YOUNG (laughter) That (garble)
DUKE He had about 20 pounds of soil, Tony, and
he came up with 1 little frag.
DUKE And we just dropped it.
YOUNG Charlie, dropped it.
DUKE That's enough.
YOUNG Yeah.
CAPCOM Yeah, lets just call that our rake sample.
DUKE Okay, we got about 4 frags in 349, okay its
349.
CAPCOM Okay.
DUKE Hey we need a soil sample, John.
YOUNG Yep. That's great. Okay, let me get 1 more
scoop full.
DUKE Okay.
YOUNG Okay,
DUKE Okay. Now how about --
YOUNG Get a little after here.
DUKE Hold that one and put it in my bag while
I Z this one up. Okay, I think we got about 10 bags left and
that's it.
CAPCOM Okay, was that bag 350, we didn't get a
number.
DUKE Yeah, 350, Tony. It was.
CAPCOM Okay.
YOUNG What are you supposed to be doing while I
do the double core?
DUKE I'm supposed to be sampling.
CAPCOM Right. Be looking around for exotic --
YOUNG (garble)
DUKE (garble)
CAPCOM -- especially things like that vesicular
basalt you described.
DUKE That's why I'm whacking on this one.
YOUNG Poor Charlie.
DUKE That is a hard rock, right there, John.
YOUNG Now, Charlie. (garble) Let me get it --
let me get it.
DUKE I got it with the rake. You want -- I got
to go get -- why don't you take that and put it in my sack
and I'll go over and get the double core?
YOUNG Carry this one over there and throw it in
the big bag.
DUKE Okay, I'll do it. Okay, Tony, I just whacked
off one at -- it -- I thought was basaltic looking but it turns
out it's glassy with the white matrix in it. John I need that--
I can use this scoop.
YOUNG Charlie, here you go.

DUKE Okay. Hey, John?
YOUNG Yeah.
DUKE Hey, come -- here's another one of those
glass balls.
YOUNG Yeah, that's a big one.
DUKE See it right there.
YOUNG Yeah.
PAO This is Apollo Control. We've just used
the T.V. camera to satisfy the principle investigator for ac-
tive sismic that, that experiment motor package was properly level.
Saved the crew having to go over and take a look at that.
YOUNG Where are your bags, Charlie?
DUKE Right here on my camera.
YOUNG Let me have them
DUKE Okay. Wait a minute. Here's a couple that
are torn off, you could use, 1 and ---
YOUNG That son of a gun, must be solid.
DUKE There you go.
YOUNG Houston, this glass ball that've I've got
doesn't have any give to it.
CAPCOM Okay.
YOUNG Going into bag 380.
CAPCOM Okay, 380.
DUKE Okay, double core's assembled. Give me the
YOUNG Impact?
YOUNG Well it's smooth on one side and has impact
pits on the other.
YOUNG What did you need, Charlie?
DUKE The scoop. I mean the rake. Pardon me.
CAPCOM Okay, and you've got about 17 minutes left
here.
YOUNG Now, you're talking
DUKE You through with the rake, John?
YOUNG Yes, sir.
DUKE Tony, we through with the rake?
CAPCOM Yeah, we sure are.

END OF TAPE

DUKE Tony, we through with the rake?
CAPCOM Yeah, we sure are.
DUKE Okay, here it G-O-E-S -- yi! Look at that beauty go!
YOUNG Okay, hammer, hammer -- here's the hammer. Okay, I'm taking these 2 big rocks and put them in the big rock bag, Charlie.
DUKE Okay, does that -- muley got to go in there too.
YOUNG Okay. Now, this looks like as good as any.
DUKE Hey, Tony, I pushed it all in on almost three-quarters of the way on the bottom core.
CAPCOM Okay.
YOUNG I'd like to hammer that one Charlie.
DUKE John, could you --
YOUNG What do you need?
DUKE --take a picture of that for me? I don't have my camera.
YOUNG Okay.
CAPCOM And John, while you're looking around there, our number one priority is a vesicular basalt.
DUKE Yeah, I understand.
YOUNG I bet we ain't going to find one.
DUKE Grrrrhhhhhhh -- it went in!
CAPCOM Ah, you're doing real good there, Charlie.
DUKE This is the most frustrating job! You'd never make a livin' as a carpenter -- wearing a pressure suit, I'll tell ya.
DUKE Okay, John, how about spinning and taking one more picture of that in the ground. Could you?
YOUNG May as well, what's the setting.
DUKE About F11 or so.
YOUNG It's F11
CAPCOM Smile Charlie°
DUKE Got it?
YOUNG Okay.
YOUNG Al, I could correctly identify this rock is out of North Ray -- no, I can't. It sure looks like that rock that we saw.
DUKE Hey, Tony, at this bottom of this core it looks whitish, and it's pretty coarse grain -- not real fine. It's sort of like a crumbly shocked rock.
YOUNG Now, Houston, I'm looking, but I'm not seeing any of --- (garble)
CAPCOM Okay, after you get this core packed up, why don't you drive on back to the LM to the normal closeout position, and we'll let you sample around there -- see if you can find one around there. You described something in a crater behind the LM.

YOUNG Okay.
DUKE Okay, the bottom was 32, Tony. Top is 27.
CAPCOM Okay, we copy that.
PAO This is Apollo Control. The crew has now been on the Lunar surface a little over 4 hours. Now we are prepared to extend this EVA about 10 minutes, or so, if necessary. They'll be returning to the Lunar Module -- the immediate vicinity of the Lunar Module shortly.
CAPCOM Sounds to me like you fellows are going to have your rock quota.
DUKE I think we'll do alright.
CAPCOM I sure think so.
YOUNG Okay, Houston, I just picked up another breccia, but it was interesting because there is some very dark glass in it, and it was primarily a white matrix.
CAPCOM Okay.
YOUNG The glass was very dark.
YOUNG You want this to go in your bag, Charlie?
DUKE Yeah, why don't you --
YOUNG -- or put it in my bag.
DUKE Stick it in mine -- I think we have plenty of room in mine.
YOUNG Yeah, yours is about full.
DUKE We got any bags left?
YOUNG No, I don't see any.
DUKE You out of bags too?
YOUNG Yeah, it's really bad, isn't it?
DUKE Wait a minute.
YOUNG I dropped one over here, I'll go back and get it.
DUKE Hey, here's some.
YOUNG Got some?
DUKE Yeah, here's a whole kit full.
YOUNG Gimme one.
DUKE Okay.
YOUNG Got it.
DUKE Okay. How much time do we have here, Tony?
CAPCOM Say again Charlie.
CAPCOM You have plenty of time here, but we'd like you to drive on back to the LM.
YOUNG Okay.
DUKE Okay, I'm going to run over, Tony, and look around and see if I can find what you want.
CAPCOM Okay, fine. And John, when you drive over we don't have to reconfigure the lacru. Just drive it the way it is and then realign and brush it off when you get there.
YOUNG Alright, will.

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DUKE
at me.

You know, that UV's been looking right

YOUNG

Okay, basalt, where are you?

PAO

That would be Charlie Duke back at the

Lunar Module.

YOUNG

Okay, Houston, I just got a spectacular

white rock.--

END OF TAPE

YOUNG Okay, Houston, I just got a spectacular white rock. This -- but it's kinda dust coated, but it is - it's so fine grained that I can't see any crystalline structure associated with it. It's sorta covered with zap, you can see plenty of zap pit. That's going in bag 1 - 13.

CAPCOM Okay, was that bag 113?

YOUNG 13.

CAPCOM Okay.

DUKE Hey, Tony, I just picked up one that is in bag 15 that has a black matrix, blueish black matrix with lap like either clase or phenocryst in it. And it's right behing the LM here. I don't know if that's what we're looking for or not.

CAPCOM Oh, good. Sounds good, Charlie.

DUKE There are a lot of the rocks that I call vesicu- ah, there are some of the rocks that I call vesicular basalts around here, but I don't know whether what I really call was correct or not. That might have lead you all astray.

CAPCOM That's okay. We've got --

DUKE That might have been just the clase coating on the rock.

CAPCOM We've got about 10 more minutes of sampling so why don't you just pick up what looks interesting to you there and then we'll start closing out.

DUKE Okay.

DUKE John, are you bringing the machine down here?

YOUNG Yes, sir.

DUKE I got my hands full of bags and rocks.

PAO John Young will be realining the antenna when he gets the lunar roving vehicle back in the immediate vicinity of the LM.

DUKE Houston, you still got locked?

CAPCOM No, we've lost the picture. We can hear you though.

DUKE (garbled)

CAPCOM No, we've lost the picture. We can hear you though.

DUKE (garbled)

PAO This EVA has now been going on for 4 hours 18 minutes.

YOUNG (garble) where we did, we might have been in serious trouble.

DUKE (garble)

YOUNG Kinda hate to work on any of those bolts.

DUKE Okay, Tony, I've picked up a rock here that has a (garbled) matrix with perhaps 30 percent of it white -- whitish millimeter size clase or phenocryst and it doesn't look glassy to me.

CAPCOM Sounds good.
DUKE It's about half of a grapefruit size.
Half of a grapefruit size.
PAO Among the tasks that Young and Duke will
be performing back at the lunar module prior to getting in
and getting things buttoned up and ready for lift off, will
be to recover the solar wind experiment, the cosmic ray exper-
iment and also the film pack from the far ultraviolet camera.
DUKE Tony, do you read? Over.
CAPCOM I sure do, Charlie.
CAPCOM Sure do, Charlie.
DUKE Okay, did you copy that about the rock
I picked up - a half a grapefruit size.
CAPCOM Yeah, we sure did. It sounds very inter-
esting.
CAPCOM We sure did. It sounds very interesting.
DUKE Okay, and it's going in bag 17.
CAPCOM Okay, bag 17.
CAPCOM Okay, bag 17.
YOUNG I don't think we need the gnomon any more
Charlie.
DUKE No, we sure don't, John.
YOUNG Do you want me to realine that LCRU,
Houston?
CAPCOM That would be fine, John.
YOUNG Okay.
DUKE Would you say my SPC's about full, John?
YOUNG Definitely.
DUKE Here, let me get yours off your back right
now so I can go use it to sample with.
YOUNG Okay, I got it.
YOUNG That PCA (garbled) Charlie.
DUKE Okay, wait a minute.
DUKE Okay, you gotta come right, alot, more
and up. There right. Okay, right. Ya see 'em. Okay, right.
YOUNG Naw.
DUKE To your right. To your right. They ought
to be in there now.
CAPCOM Yeah, we're getting a picture.
YOUNG (garbled)
DUKE Let me - ar - up -
YOUNG Nothing with it.
CAPCOM Ah, we lost it again.
YOUNG (garbled)
DUKE Pretty far up there
YOUNG I told 'em about (garble)
DUKE Need to go down.
YOUNG Oh, yeah.

YOUNG That's the MPD to come --- (garbled)
You ought to have one (garbled)
YOUNG I can't see it.
DUKE (garbled) know how to do it.
YOUNG Yeah, you just tilted the whole works,
Charlie.
DUKE Yeah, I know it. Wait a minute. I'll go
get (garbled). Push it over towards me. Give me the handle.
YOUNG Okay.
YOUNG -- this way.
DUKE Say, pull it.
DUKE John, we're having so much trouble with
it. Hey, you got a signal --
CAPCOM Hey, there we got a picture.
DUKE 31, 32. Leave it there, that is good
enough.
YOUNG Right.
DUKE Just leave it. It's 32, that's 32.
CAPCOM Yeah, let's just live with that.
DUKE Yeah, it's going down. that's 35. John, it
looks good.
YOUNG Way down.
DUKE That's 35, John. It looks good.
YOUNG Okay.
DUKE Okay.
DUKE Spent 20 minutes adjusting the TV and then
turn it off. Going back out to --- right here.
YOUNG Yeah, I want to dust it.
CAPCOM Okay, and John, when you're ready, I've
got a new UV setting.
YOUNG Okay, we'll reset the UV.
CAPCOM And Charlie, you can continue sampling
for about 5 more minutes and then we'll have to load up.
DUKE Okay. That's about 3 samples. I'll be
out of bags then anyway.
CAPCOM Okay.

END OF TAPE

YOUNG Okay, with the new UV settings. Wait a minute.

DUKE Tony, I'll say one thing that the character of the regolith has really changed between here and Stone Mountain and -

YOUNG Okay, Houston I'm going to reset.

CAPCOM Okay, and your azimuth is 275 and the elevation is 66.

YOUNG 275 and 66, alrighty.

DUKE There's a grab sample in 18.

CAPCOM Okay, bag 18.

DUKE Well, it partially documented I should say, not a grab sample.

CAPCOM Right, we've got it on TV. The big eye's on you.

DUKE The big eye, okay. There's a neat rock.

YOUNG Right there doesn't look like a breccia.

YOUNG Okay, 275 and 66.

CAPCOM Okay, that's affirmative.

DUKE Boy, I hope this baby works.

CAPCOM Okay, Charlie, after this rock we'd like you to start closing out.

DUKE Okay, I'll do it. Bag number 19, Tony.

CAPCOM Okay, bag 19.

DUKE And, Tony the last one I pick up is an igneous rock, no breccia.

CAPCOM Hey, outstanding.

DUKE I am not kidding. And it's got glass crystals in it and a black matrix but it is not - it is not basaltic.

CAPCOM Outstanding, Charlie.

DUKE Well, it was going in bag 19, it's not anymore.

YOUNG I'll come over and help you, Charlie.

DUKE No, I got it John. In bag number 20, Tony.

CAPCOM Okay, bag 20.

DUKE We've got to start - he wants us to close out now, John.

YOUNG Okay. Okay, I guess we're through with those samples. (Laughter) Houston this dust is just like an abrasive. Any time you rub something you can no longer read it, and that's what happened to our RCU's and our - and our and (garble). In other words, it's a mistake to rub something to clean it off.

CAPCOM Understand.

YOUNG It's a mistake.

CAPCOM Okay, we're starting a little bit ahead of time on the close out here and we would like you to take your time and make sure we get everything.

YOUNG So would we.

DUKE You can bet we're not going to leave anything.

CAPCOM Good show.
DUKE Okay, Tony, the core tubes are going in
bag number 7.
CAPCOM Okay, core tubes in bag 7.
DUKE And it's hardly got any rocks in it. John,
you want to all close mine.
YOUNG Okay.
DUKE B twelve here.
YOUNG When we do malfunctions I don't want that
page.
CAPCOM We're with you, John.
DUKE Okay, LRV config -- we got --
DUKE Huh?
YOUNG Okay, Charlie, here you go.
DUKE Okay. What are you going to do with it?
YOUNG Put it -
DUKE Just put it in there and I'll fill up
the rocks.
DUKE Want to pull my PLSS tube carrier.
YOUNG Better believe it.
DUKE Harness.
YOUNG Best day of my life.
DUKE Okay. I'm glad we didn't have an emer-
gency, quick relief 10.
CAPCOM And -
DUKE That's the one that we couldn't get snapped
inside the LM (garble).
CAPCOM And John you might try to keep a hold of
the sample bags for when you go out and park the rover. We
may have you pick up a rock and put it on the LPM.
YOUNG Oh, yeah, forgot all about that. You
want me to - I'll take my camera with me too.
CAPCOM Rog.
YOUNG Charlie's camera one. You got any pic-
tures left?
DUKE Yeah, do you?
YOUNG Nope.
DUKE You out completely?
YOUNG No, no I'm on frame 150 I guess I've
got enough to cover it.
DUKE Oh, you got enough. Your not going to
drive out there yet are you?
YOUNG Oh no.
DUKE Okay. Put it in my teeth.
YOUNG You got the bags, Charlie.
DUKE I threw them away, John, they said they
were through with them.
YOUNG Okay, well here's one right over here.
DUKE They're down to the left of the LM, there.
YOUNG Here's one right over here.
YOUNG Okay, I've got to go get that (garble) here.

YOUNG Okay, just leave it under your seat, okay.
DUKE Okay.
YOUNG Okay, reset the far UV, PLSS tube carrier,
both DDR cosmic ray experiment. (garble) to table. Okay,
Charlie, I'm going to be working on the table here for a second.
DUKE Okay, fine.
YOUNG I've got to get rid of this LCRU pallet
so I can stick.
DUKE Hey, Tony.
CAPCOM Yeah, Charlie.
DUKE Is Stu around?
CAPCOM Yeah, he's right here.
DUKE If he is tell him - if he is tell him
64 charlie just topped the Mount Whitney event.
CAPCOM Okay, we'll do that.
YOUNG Great code on moon.
CAPCOM Okay, evidently, he knows what you're
talking about.
YOUNG Uh huh. Okay.
DUKE Got that ETB. On ETB let's .
DUKE The (garble) is already in the spacecraft.
Man, Tony, you don't know how much fun this has been.
CAPCOM I'll tell you, Charlie. Yeah, I think
it's been obvious in your voice how much fun it's been.
Okay, Charlie anytime you put anything in the spacecraft would
you call it off.
DUKE Okay, I'm putting things in the ...

END OF TAPE

DUKE Okay, I'm putting things in the ETB right now.

CAPCOM Okay, could you call it off as you put it in there? We'll keep track -- will that help ya.

DUKE Okay. All the film that we brought out, except the two mags -- the mag on the DAC and the 2 mags on the camera -- magazine F and magazine Echo are still on the cameras. John's seat bag is empty of film.

YOUNG Okay, Houston, the cosmic ray experiment plate will not pull out. Oh no.

CAPCOM Okay, we copy that.

YOUNG Man, there isn't even a strap to pull it out with.

CAPCOM If you hold it upright, shake it, do you think it will come out the bottom?

DUKE Want me to do that?

CAPCOM Yeah, why don't you try that.

DUKE Yeah, why don't you pull and let me hold the thing.

YOUNG No.

DUKE John, let me suggest -- let me hold it -- the frame and you pull on it.

YOUNG Here we go.

DUKE That'll get it.

YOUNG Damn it, there's no string to hold on to.

DUKE How about your pliers.

YOUNG There you go.

DUKE Can you reach them? You want me to get them for you?

YOUNG Yeah. Move your arm up.

DUKE Okay, there you go.

YOUNG Get it so I can get the thing open that's right Get the first spring out, then we can get it. I don't know, it may could be a struggle all the way.

DUKE I didn't see it move at all.

YOUNG It moved -- oh, about (garble).

DUKE Okay. -- phew, pullin' the thing off.

YOUNG Hit it a couple times. Turn it loose.

DUKE Looks like to me the thing is so -- this thing is hot! I'll tell ya -- there it comes!

YOUNG There ya go --

DUKE Hot dog! It broke it loose.

YOUNG Yep, I think you got it now, babe. Woop!

(garble)

CAPCOM Good show! Good work, Charlie!

DUKE Can you stick it back in there?

YOUNG Yeah.

DUKE Hey that -- thanks for those pliers, boy!
We'd never done it! I could feel that through my gloves!
Okay.

YOUNG Okay, the first panel is black and 180
degrees in.

CAPCOM Okay, we copy that.

DUKE It's on the back, and it was facing right
into the Sun -- Okay, I got the magazine off the DAC, Tony.

CAPCOM Okay.

DUKE You can be the PAC mag, mag-
azine 2 the DAC Okay, you don't want me to put any DACs --
magazine T on the DAC do you?

CAPCOM No, if it's out of battery, there's no
point.

DUKE We're not going do that Descartes olym-
pics thing.

CAPCOM No, okay, fellas, let's not put anything
on the DAC.

YOUNG Okay, the template on the top one.

DUKE Okay, I'm just going to leave it on the --

YOUNG The template on the top one is black and
a 160 degrees F.

CAPCOM Okay.

YOUNG And there -- the one that is 8, the 8template
on the top is black at 120 -- is black at 120 and gray at
160.

CAPCOM Okay.

YOUNG So, it must have stayed relatively cool.

CAPCOM Good show.

DUKE Okay, Tony, when I -- that thing was hot
I tell ya, when I had the frame I -- after about how ever
many minutes there, I could start feeling it through my
gloves.

CAPCOM Roger, we got that.

DUKE John, those pliers are going to hang you
up. You want me to unsnap 'em?

YOUNG Okay, they're unsnapped. No they aren't
either.

DUKE You want 'em unsnapped?

YOUNG No, I just threw it back in there.

DUKE Okay, give it here.

YOUNG It's all work.

YOUNG Wait a minute -- wait, wait. (garble)
don't pull it down.

DUKE Okay, you got it.

DUKE Okay, take the mags off, (garble).

YOUNG Okay, cosmic rays detector bag.

DUKE (garble) Okay, no more -- okay, Tony,
we're not doing any gran prix anymore, are we?
CAPCOM Negative.
DUKE You're clipping badly, Tony, say again?
CAPCOM Negative, no gran prix.
DUKE Okay, I'm going to retrieve a cosmic ray
now.
CAPCOM Okay, it's all in, Rog.
YOUNG Charlie, I just retrieved it.
DUKE I don't mean the cosmic ray, I mean the
SWC.
CAPCOM Rog, we understand.
DUKE Oh, just like in training.
YOUNG Okay, the cosmic ray detector is bagged,
and as near as I can tell, there's no thumbprints on it --
on any of the plates.
CAPCOM Okay.
DUKE This things got a minus (garble) Tony.
YOUNG Look at that, Charlie! Clean across the
crater.
DUKE Here goes the javelin throw!
YOUNG WOW! won't win any world's record, but...
DUKE Okay, Tony, this thing, when it wound
up, I tried -- it got away from me -- it tore just a little
bit, but I think we'll be able to get it in the bag. Up
at the upper part. It wound up like a window shade.
CAPCOM That's okay, it'll work fine that way.
Doesn't make any difference.
DUKE Okay, I got it wound up.
CAPCOM And, John, I understand there's a temple
label on the CRE bag -- uh, did you get that?
YOUNG No, I'll get it later.
CAPCOM Okay.
YOUNG In fact, I'll get it right now. Okay,
it's all okay.
CAPCOM Okay, understand.
YOUNG -- (garble) little.
CAPCOM Okay, Charlie, and verify -- remember
the drum on the penetrometer.
DUKE Yep, thank you.
CAPCOM Okay.
YOUNG Okay, Charlie, I put the big rock bag
on the ladder hook.
DUKE Okay.
DUKE Actaully worked, Tony, it came off.
CAPCOM Good show.
DUKE Did you get the big rock out of the foot
pad?

YOUNG Yeah.
DUKE Did you get ol' muley out of there?
YOUNG Okay, Charlie, is this bag here for to go
inside?
DUKE No, I didn't put it there.
YOUNG That's the one that was there from last
time.
DUKE (garble) SCD2
YOUNG Yeah, SCD2. I'll throw that up on the
LM.
DUKE Okay. This bag is pretty full. We got
2 full rock bags and one that is partially full, John. We
got -- 4 and 6 are full and 7 has got 2 core tubes and a --
excuse me.
YOUNG Okay.
DUKE This shadow is almost gone!
YOUNG Are those core tubes? -- do they have anything
in them?
DUKE Yeah.

END OF TAPE

YOUNG Are those core tubes -- they got anything in them?

DUKE Yeah, sure do! Did you finish -- let me get one more picture of you dirty.

YOUNG Okay.

DUKE Okay.

DUKE Turn around --

YOUNG Wait a second, Charlie.

CAPCOM Are you sure you want a record of that?

DUKE Okay, Tony, got the magazine from the --

CAPCOM Go ahead, Charlie.

DUKE -- the DACs, all the mags, say again?

CAPCOM I just said go ahead, Charlie.

DUKE Okay, only thing we don't have in the ETB that I see is the CRE, and that's going in right now.

CAPCOM Okay.

DUKE What, Tony, what -- hey, John, you're taking a camera with a magazine out with you?

YOUNG Yes sir.

DUKE Okay.

YOUNG Okay, Houston, I got one more rock here that I was looking at out of the window of the Lunar Module, I got plenty of pictures of it for you.

DUKE Put it in the big rock bag --

it'll go in that ETB --

YOUNG Yeah.

DUKE Right there.

YOUNG It's not all that big.

DUKE And, I'm going to put magazine Foxtrot under the ETB, and it's got 130 frames exposed.

CAPCOM Okay.

DUKE Hey, John.

YOUNG Yeah.

DUKE Take a look.

CAPCOM Okay, Charlie, you should have a -- Charlie, you should have a 70 Hasselblad and 3 DAC magazines racks -- there will be 6 in there right now, one's still on John's camera.

DUKE Okay, standby.

YOUNG Where's the bag that the good ol' UV --

Hey, Charlie, did you throw my camera away?

DUKE No, I didn't throw your camera away!

YOUNG Where is it? Over there?

DUKE Yeah.

YOUNG Okay.

DUKE The bag that the what? The UV bag is upstairs. Just bring the cassettes.

YOUNG Alright.

CAPCOM That's right.
 DUKE Okay, Tony, we got 1, 2, 3, 4, 5, 6,
 Hasselblads, 3 DACs, a SWC and a CRE, the maps, and various other
 things.
 CAPCOM Okay, and the penetrometer drum.
 DUKE Yeah, and that's in there too.
 CAPCOM Okay, good show, sounds like you got it
 all.
 DUKE John, is this your -- your mags go in
 there, John, and that's it.
 YOUNG Okay, let me drive this up the hill.
 DUKE Okay.
 YOUNG Bearing 265.
 DUKE Tony, a special -- a special salute to me from
 me to the United States Air Force on their silver anniver-
 sary this year. The lunar boys in blue is pretty far out
 right now.
 CAPCOM You bet you sir. That's outstanding!
 DUKE Okay, John, we got 4 hours and 15 minutes
 or so.
 YOUNG Okay.
 DUKE Oh, my watch stopped. How about that?
 Okay, let's see. Head for -- I'll start taking the -- as
 you -- turn the -- LRV configure you gonna do -- let's
 see, the DAC drivin' WC astro actions we're gonna bypass,
 Okay, we got to clear the EMUs and store antennas before
 you drive off.
 YOUNG Okay.
 DUKE I guess.
 YOUNG Here's the ol' dust brush.
 DUKE Hey, I'll tell you what, why don't you
 park the Rover while I make sure everything is under the LM,
 and we'll dust when we get back. Okay?
 YOUNG Okay, I'll -- yeah, I'll bring the dust
 back.
 DUKE Okay, and I'll just take a couple of
 SEBs and take them in here -- I'll bring -- you got to get
 that -- (garble)
 YOUNG They want the LPM out here.
 DUKE Oh, that's right, yeah.
 YOUNG Okay, I'm going to park the Rover, Hou-
 ston, I think we got everything out of it there is to get,
 okay?
 CAPCOM Okay, it sounds good, and we think so too.
 YOUNG We were going to do a bunch of exercises
 that we had made up as the "Lunar Olympics" to show you
 what a guy could do on the Moon with a backpack on, but
 CAPCOM For a 380 pound guy, that's pretty good!
 YOUNG They, they threw that out.

DUKE Yeah, jump flat-footed straight in the air,
 300 about 4 feet. Wow! Gollie, that ain't any fun, is it?
 YOUNG That ain't very smart!
 DUKE That ain't very smart.
 DUKE Well, I'm sorry about that!
 YOUNG Right. Now we do have some work to do!
 DUKE How about a hand John, --
 DUKE There we go.
 DUKE Okay.
 YOUNG Okay, I want to park the Rover.
 DUKE Okay, I'll start upstairs then.
 YOUNG Well, no, you're too dirty to go up there!
 DUKE I'm not going in, I'm just taking some bags
 up, okay?
 YOUNG Okay.
 YOUNG Okay, do you want the LCRU to switch 1 when
 we start out there, right Houston?
 CAPCOM Yes, that's affirmative.
 DUKE Do you read over?
 YOUNG Okay going to switch one.
 DUKE Hey, Tony, I'm going to be taking SCB.
 CAPCOM Okay, Charlie.
 YOUNG Houston, the problem if you must know it was 085
 at 110. That's a reading put that through a crater that's a-
 bout 18, 20 feet deep, and it's too steep to climb in and out of.
 CAPCOM How far is it to the other side of it, John?
 YOUNG It's only a couple of feet. We'll get her
 at 085 at 100 meters.
 CAPCOM Okay, that'll be fine.
 YOUNG Something here has reset the range and --
 DUKE Okay, 1 bag is up, Tony.
 CAPCOM Okay, was there -- did you see the number
 on that? Don't go back to look --
 DUKE I'm sorry I didn't --

END OF TAPE

CAPCOM Okay. Did you see the number on that?
Don't go back to --
DUKE I'm sorry, I didn't. 6 or 7, we got
6 and 4 down here.
CAPCOM Okay, it must have been 7.
DUKE Thank you.
CAPCOM And Charlie, I understand you got
muley rock and put it in the big rock bag.
DUKE John did, rog.
CAPCOM Okay.
CAPCOM And John, once you get parked out there,
we're going to need that whole front end brushed off, if
you just want to start on the panel and work back, that's
probably the best way. We'd like you to use the --
YOUNG Understand.
CAPCOM Okay, we'd like you to use the small
lens brush on the (garble) lens.
YOUNG Okay, Houston, I'm parked on a slope
towards the -- of about 10 degrees, or 5 or 6 or 7 degrees
towards the Lunar Module and it's my guess that this will
help your coolant some because it's looking towards
deep space a little and I'm about a 100 yards directly aft
of the Lunar Module. Is that where you want this contrap-
tion to be?
CAPCOM Okay, it's heading 165.
YOUNG Yep, heading is 165.
CAPCOM Okay, fine.
CAPCOM And before you turn it off there, we'd
like a complete readout.
DUKE Okay, I don't want to do any unnecessary
brushing, how about somebody reading the EVA closeout decal
to me, this thing is so dusty, I can't read anything.
amp hours well, bearing is 243, which can't be right.
distance is 11.4, range 210. Amp hours is 28 and 120 on 2,
and amps, of course, are off-scale low. Volts are 65 65.
forward and rear motor temps. are offscale low. And, of
course, the battery 1 is off-scale low and battery 2 is
reading 143.
CAPCOM Okay, we copy that, 43.
DUKE That do it, Houston, for you?
CAPCOM Right.
YOUNG Okay, now Pete, how about reading the
closeout decal to me there, because I can't see it for the
dust, even after I brush it I can't see it.
CAPCOM Okay, the closeout, circuit breakers
all open except auxiliary, bus A and B should be closed.
DUKE Hey, Tony, I got two bags up and I'm
going to have to wait and let John take in the rest, and
I'm sweeping up the area and it looks like everything is
pretty much under the LM.

CAPCOM Okay, and John, auxilliary circuit
breaker bypass on.
YOUNG Okay, wait a second there.
CAPCOM Okay.
YOUNG Okay, the bypass switch is coming on.
CAPCOM Okay, the crew power external and mode 3
TV remote.
YOUNG Okay, let me line up the high gain.
CAPCOM And John, while you're up on the front
end, take the TV lens shade off.
YOUNG Take the lens shade off?
CAPCOM Rog. Just take it off and throw it away.
YOUNG What do you want to do with it?
CAPCOM Just take it off and throw it away.
DUKE Tony, I tried some max cooling there for
a second and this PLSS, it really freezes you.
CAPCOM Okay.
DUKE Okay. How you doing babe?
YOUNG (garble)
CAPCOM Okay, Charlie, if you're out of things
to do there, why don't you go on out where John is and
see if you can find an igneous or a hard breccia to put on
top of that LPM.
DUKE Okay, I'll do that.
DUKE I was just standing there. I don't have
a camera though now, Tony.
CAPCOM Just a minute John.
YOUNG Go ahead, Charlie.
CAPCOM All right.
CAPCOM Okay, John, verify that the circuit
breakers you still have in on the panel are OX and
circuit breakers A and Charlie.
YOUNG Roger. (garble)
CAPCOM Okay. And if you have a chance to aim
the high gain we'll get our TV back.
YOUNG (garble) bus A is in, bus B is in and
the rest of them are full.
CAPCOM Okay, we would like B out and Charlie
in and Delta out.
YOUNG That's the way I got it.
CAPCOM Okay, fine.
DUKE Where's your camera John?
YOUNG Right here, Charlie.
DUKE Okay, hard breccia or igneous rock.
DUKE Here's a TV shade.
YOUNG Charlie vector me in again.
DUKE I can't do it from here, John.
DUKE Looks like to me you got to go right.
Or down to you, I guess it is.
YOUNG Okay, this one looks pretty good right
here.

APOLLO 16 MISSION COMMENTARY 4/23/72 2:19 PM CST 170:37 GET MC648/3

PAO This is Apollo Control. Young and Duke have now been on the lunar surface for approximately 5 hours. This EVA is now 5 hours 4 minutes long, since they depressurized the lunar module. And Flight Director, Pete Frank says we hope to have them back in the lunar module and pressurized within about 20 minutes.

CAPCOM The first measurement we'll put it on the LPM, take a picture of it on the LPM and then we'll get an LPM measurement of it and then pack it and bring it back.

END OF TAPE

YOUNG LTM. Take a picture of it on the LTM. And then we'll get a LTM measurement of it and then we'll sack it and bring it back.

DUKE Okay, it's a pretty good one, but it's too big to sack, unfortunately.

CAPCOM Do you have a smaller one around that we could get in the sack?

DUKE Now let me look. That was a good one.

CAPCOM Now we're getting a picture.

YOUNG (garbled)

CAPCOM Now we're getting a picture.

YOUNG Okay.

CAPCOM Now we're getting a picture.

YOUNG I'll tell you when it gets to be a (garbled) it's really hard to see.

YOUNG Gee, I want to tighten down your little screws there.

DUKE How, about one a half an orange size, Tony.

CAPCOM That would be great. Really great.

DUKE Okay. I'm going to get a couple of cross sign stereos is all. Is that alright?

CAPCOM That's fine. We've got the location on TV and John when you start dusting off the PAL we'd like to reset to caution.

YOUNG Okay, does that embarrass you?

CAPCOM Naw, it's just that you got a thermo leak there.

DUKE Okay, Tony, it's an igneous rock. Not a breccia.

CAPCOM Okay, great.

DUKE And it's got that sugary texture to it.

CAPCOM Okay.

YOUNG Yes, the batteries need dusting.

DUKE John, why don't I do that and you put the LTM out.

YOUNG Hey, there you go.

DUKE Okay, here's your rock.

YOUNG Okay, why don't you set it on the seat, huh?

DUKE Okay.

YOUNG The camera too. Charlie, lay the camera up there.

DUKE Yeah. Okay, Tony, that's frame count 156 and 57 155 and 156 for that rock.

CAPCOM Okay, we copy that.

DUKE I'm not sure we got -- We got a bag left, John?

YOUNG Yeah, I put a bag under the seat.

DUKE Oh, good.

YOUNG Here's a Bat switches coming on, Houston.

CAPCOM Okay.

DUKE (garbled) I dusted the back mirror and then I dusted the front and now I gotta -- be duster.

CAPCOM Alright, then, Charlie, we'd like you to dust that panel and the top of the console.

DUKE Alright, sir. Just a moment.

CAPCOM Okay.

DUKE What panel?

CAPCOM The control panel on the LRV.

DUKE Oh, alright.

YOUNG Why do you want to do that, Houston.

CAPCOM We want to keep the temperature of the panel down.

YOUNG (garbled) see if anybody comes back.

CAPCOM I guess so. Keep it nice for the next guy.

YOUNG (laughing) Okay.

DUKE Okay, the top of the panel is dusted, Tony.

CAPCOM Okay, great.

DUKE Sometimes I think I'm a--ant.

CAPCOM And we'll need all sides of that console I guess. That panel you just dusted.

DUKE Alright.

DUKE The top and the drivers side is dusted.

Ah -- the left battery's dusted. I'm going to dust the LCRU.

CAPCOM And, Charlie, after dusting the LCRU there you'll have to tear off one of those thermal blankets and put it over the control panel on the LCRU. The big one. The 65 percent one.

DUKE The which one?

CAPCOM The 65 percent blanket and John, we saw you get back and we started your clock.

YOUNG Okay, thank you.

YOUNG Let me show you what to do with that one Charlie.

DUKE Okay.

YOUNG Do you want a picture of that -- you want a picture of it, don't you?

CAPCOM Yeah it'd be a good idea.

DUKE I think I see how it goes.

YOUNG Now, you know, we sure hope you guys have enjoyed watching this as much as we've enjoyed doing it. There's one thing that's a real pleasure, it's this gravity environment.

CAPCOM Okay, and you've got a minute and we've sure enjoyed watching, I can tell you.

DUKE Well, I hope we got all the rocks, Tony, that are here.

YOUNG We got all the rock types that look different from any other rock type.

DUKE John, is that right on the thermal blanket.
It covers the thing.

YOUNG That's pretty good. Now, it pulls down --
in the -- let me show you.

DUKE Oh, I see.

YOUNG Something to attach it to down there.

DUKE Yeah.

YOUNG Ah, you got it.

DUKE Yeah.

YOUNG Super.

DUKE I got one more battery to go.

CAPCOM John, do you want to get that and don't
walk towards the LTM there Charlie.

YOUNG Rog.

YOUNG Okay, I'm going to read the LTM, Houston.

CAPCOM Okay.

YOUNG Okay.

DUKE Okay, Tony, the center mirror on the Rover
is a little streaky but it's ---

YOUNG Charlie, will you read that.

DUKE X is 322, Y is 530, Z is 510.

YOUNG If I can't turn it on in 10 seconds, I'm
going to quite.

DUKE X is 322, Y is 531, Z is 507. X is 321,
Y is 531, Z is 510.

CAPCOM Okay, we copy that. And when you put the
rock on we'd like a couple of cross signs of it.

YOUNG (garbled) the rock.

DUKE Don't forget your camera, John.

YOUNG Okay.

YOUNG Here's the rock.

DUKE I'll get the camera for you. And I guess
I'll go on back and take the brush. Okay?

YOUNG Okay.

DUKE I'll bring your camera out.

CAPCOM And leave that lens brush there for John to
dust the lens with.

YOUNG And you didn't dust the lens, Charlie.

DUKE No, I forgot it. I'll get it.

YOUNG Dust the lens over the mirror and then you go T
to redust the mirror.

DUKE Yeah, I know. That's why I'm going to
bring it around this way.

CAPCOM Good, plan, Charlie.

YOUNG Better dust the LCRU.

DUKE I will.

YOUNG Okay, here's your camera.

DUKE Okay, Tony, there's your lens dusted.

DUKE You're pointed about 10 degrees down, after
the rover.
CAPCOM Okay, fine
DUKE 7:00 o'clock.
YOUNG Those mirrors are as clean as we can dust
'em, Houston, if they don't cool down then there's a problem
with thermal --
CAPCOM Okay.
DUKE I'm going on back, John.
YOUNG Sir?
DUKE I say I'm going back.
YOUNG Okay.
DUKE I promise not to get in till you dust me.
YOUNG Okay.
DUKE Sorry about falling down there, (garbled).
YOUNG Okay,
DUKE It's only my fifth time, I think.
YOUNG five times and how many hours is not to bad
Charlie.
DUKE I'm a show off.

END OF TAPE

DUKE It's only my 5th time, I think.
YOUNG Five times in that many hours is not too
bad, Charlie.
DUKE Trying to show off. Can't get over this big
crater, John, behind us.
YOUNG Okay, it's still level and the sun's shadow
is still aligned.
CAPCOM Okay.
DUKE Tony, is your T.V. camera working?
CAPCOM Yeah, it is. We're driving it around now.
Will be around by John in a minute.
DUKE Okay.
YOUNG Close the hand tool carrier.
DUKE Don't forget that mag on that camera.
YOUNG Okay, Houston, I'm back at the --
CAPCOM Okay, and I started the clock. Did you
get a picture of it while you were out there?
DUKE You got the dust brush?
YOUNG Yeah, I did a stereo pair.
CAPCOM Okay, fine.
DUKE Yeah, I got the dust brush, John.
YOUNG Okay.
YOUNG Okay, go to it, Charlie. Your giving me
that minute aren't you, Houston?
CAPCOM Yeah, I sure am. You've got about 20 seconds.
YOUNG I just got a picture of one of the great
moments in history, Houston.
CAPCOM How's that?
YOUNG (laughter) Charlie looking down into a
crater that's (laughter) 10 feet --
CAPCOM Okay, and mark John.
YOUNG -- 10 feet to the rear footpad and it's
25 foot deep. Sir?
CAPCOM Go ahead.
YOUNG Okay, Houston, 317 525 5--317 525 513.
320 526 513. 321 526 513.
CAPCOM Okay, we copy those.
YOUNG (garble) Houston.
CAPCOM Okay, if you'll bag that one --
YOUNG And the REV switch is going off.
CAPCOM We've got it here and you go on in.
YOUNG What do you want. What do you want me
to do with the LCM, what to get it out of the way so it doesn't
flop around and hit the LCRU at lift off or something?
CAPCOM Uh, we're not too worried about it, just
leave it there.
YOUNG Alrighty.
CAPCOM And, John, when you bag that, we'll need
a bag number.

YOUNG Charlie, this is pretty good rock.
DUKE It is isn't?
YOUNG It's got a spectacular little zap pit in it.
It's lined and it's all silvery and glassy. Fred Hurst, will appreciate this rock.
DUKE Yeah.
CAPCOM We'll appreciate them all.
DUKE You can see those sugary textured ones.
CAPCOM And we better hustle on back on, we're getting (garble). At 331.
YOUNG Oh, okay.
DUKE We're getting what, Tony.
CAPCOM We're getting up against the time limit. We'd like you to get on in. That's not our PLSS time limit.
DUKE Yeah, I'm standing at the foot pad ready to get dusted and get my antennas. Say again.
CAPCOM That's not a PLSS time limit. That's in time for getting ready for lift off.
YOUNG Yeah, understand.
CAPCOM And, Charlie, I interrupted what were you saying?
DUKE Dinda looks, oh, I don't remember.
YOUNG Boy, Houston, the beauty of this place is absolutely incredible.
CAPCOM We agree. There's another spectacular view, the pilot who missed the crater.
DUKE Watch out. Watch out, John, --
YOUNG Yeah.
DUKE -- to your left is that crater.
YOUNG That'd be pretty good to miss it on landing and fall in on it before taking off, huh?
DUKE Well the way I'm been falling I probably would, that's why I steered way clear. Boy this back pack, once you get it torqued off you can't stop it.
YOUNG Not without moving.
DUKE That's right. Fast. Okay.
DUKE Yeah, I'll put -- you take the camera off I'll put the rock in the SEB over here.
YOUNG Okay.
DUKE Okay, did you give them the bag number?
YOUNG Yeah.
DUKE Okay, Houston, I'm up to frame count 168, on magazine E.
CAPCOM Okay.
DUKE Okay, John. Ready to be dusted. Boy that's the last one.
YOUNG It's not going to come out, because--
DUKE Yeah, your going to have to take it off.

YOUNG Okay, lets take (garble).
YOUNG Get shot 169 of the old Rover sitting there.
Boy that's a good machine.
DUKE Yeah, it's an incredibly good machine.
Okay, okay, there you go.
YOUNG Now we got some work to do here, boy. Your
all dirty.
DUKE You ought to see your back.
YOUNG I couldn't have gotten any dirtier than you.
DUKE The only other thing we need, John, is far
UV mag.
YOUNG yeah.
DUKE I think this stuff is just ingrained into
the suit right now.
YOUNG yeah, I don't think we're going to be able
to get it off. Little bits coming off your arm, when I whack it.
There we come. Well the message is clear.
DUKE what?
YOUNG Don't lose the fins off the Rover.
DUKE Yeah, you ought to see the top of your hel-
met. Looks like little mud drops.
YOUNG Get a little further away, Charlie.
DUKE Yeah. I'll get it off my legs, John.
YOUNG Okay.
DUKE Could you close that pocket so that dirt - -
YOUNG Want to get the pockets off?
DUKE Well I don't think we have time. Lets get
I just want to get the thing closed.
OOUNG Okay.
YOUNG I got it. Now that's great.
DUKE That's where all that dust came in from
yesterday, was -- yours is closed.
YOUNG Okay, let me try you now. I'm off your
(garble)
YOUNG Uh, oh, did I turn your comm?
duke No, it's on.
YOUNG Golly, that Rover, really.
DUKE Okay, let me get under here.
YOUNG Okay, now there we go a little bit it's
working. Boy I tell you Houston, if we just had some air
up here we could fly this.

END OF TAPE

YOUNG There we go the little bit is working.
Boy, I tell you, Houston, if we just had some air up here we
could plow this.

DUKE Turn around, John.

YOUNG Sure is good looking dirt I'll tell you
that.

CAPCOM Maybe some day.

DUKE Okay, (garble).

YOUNG Man, it is brand new.

DUKE Yeah, I think I got most of that stuff
off that rover wheel because your - on my side is the worst.
Your arm over your helmet. There we go. Okay let (garble)
around here. Okay, that's probably about as good as we're
going to do, John.

YOUNG Okay.

DUKE Okay, antennas and I guess I'm ready to
climb in.

YOUNG Well, you know I don't think we need to
worry about the antennas but let me get yours. Golly, look
at the top, you worry about that, let me get the top of your
PLSS cleaned off.

DUKE Okay.

YOUNG Here, come on by the ladder.

DUKE Okay.

YOUNG (Garble).

DUKE Is it on the LPS.

YOUNG All over it.

DUKE Yours is dirty too, I didn't - couldn't
reach it though, it's on bypass. Might be a good idea to let me.
do it.

YOUNG (Garble) OPS is still on.

DUKE You better lean over and let me get yours.

YOUNG That rock bag is filthy. I heard of
dusting off, but I didn't know we were going to have to go
from the top down. Stand up, Charlie, and let me get the
back of it.

DUKE You know that engine bell didn't even
blow out that big old rock over there.

YOUNG I know it. There you go.

DUKE Well, PLSS side anyway.

CAPCOM Okay, fellows we should be pressurized
in about 5 minutes.

YOUNG There you go.

DUKE Oh, that's great. Wait is that dirty.
Can you -

YOUNG Yeah.

DUKE My knee on your antenna.

YOUNG Okay.

DUKE Okay turn around with this bow.

YOUNG You want me to get out.

DUKE No, your great right (Garble). Okay, that's the best I can do, John.

YOUNG Well, boy, that's about it Charlie. That's about the best we can do.

DUKE Let me bend over and I'll get your antenna. I'll put my visor down. About had it and it slipped out. Five man operation here.

YOUNG Man, Houston, this portable life support system is really a good piece of gear.

CAPCOM Okay.

DUKE Okay, it's down.

YOUNG Houston, are you reading us, over.

CAPCOM Yeah, we are. Are you copying us?

YOUNG (Garble). I like it better than - Houston, are you reading us, over.

CAPCOM We copy you 5 by, how us.

DUKE Go on get it.

YOUNG Why don't you go ahead and get in.

DUKE You want to get that antenna?

YOUNG Your antenna?

DUKE Yeah.

YOUNG No, we don't need it anymore do we?

DUKE Okay, no.

YOUNG Okay, I don't know what happened to the comm.

CAPCOM Hello, Orion this is Houston.

YOUNG Hi there, we lost you for a while.

CAPCOM Yeah, we sure did. We're getting back on the timeline we'd like to hussle you on in there.

YOUNG Charlie's climbing through the door right now, Houston.

CAPCOM Okay, and you've got the UV to get yet.

YOUNG That's right.

CAPCOM Okay.

DUKE What happened to the comm, Tony?

CAPCOM I think we had a drop out down here.

DUKE Okay. Okay, Tony I'm inside.

CAPCOM Good show.

DUKE With two rock bags.

CAPCOM Okay, and we'll skip the track light test, and just let you get on in.

DUKE It works, Ken saw it during the -

YOUNG Yeah, we've already tested it once.

CAPCOM Okay, fine. Let's not do it now.

DUKE I'm sorry, John, but I brought some dirt in with me.

YOUNG Okay, Charlie, I'm going to bring up the - Houston, I'm going to reset the far UV camera.

CAPCOM Okay, reset 3 times.

YOUNG And move the mag.
CAPCOM Okay and camera off.
YOUNG 2, 3 okay then cameras coming off, and
can is full, cassette is being removed it's out.
CAPCOM Good show.
YOUNG And - and it and bag 6 are drug up the
ladder this time again.
CAPCOM Okay, and Charlie you are going to get a
feed water flag pretty soon. Just leave it don't put on the
auxiliary.
DUKE Okay. What's your time, Tony.
CAPCOM Okay, you've been out 5:31.
DUKE Okay, you did it now there it goes - there
it goes.
YOUNG (Garble).
CAPCOM We'll be down about 10 minutes when you
get in.
DUKE Okay, I forgot to wind my watch so that's
why I was asking.
YOUNG Okay, Charlie this bag is coming open.
Wait a minute.
DUKE Okay.
YOUNG Here's a bag.
DUKE Okay.
DUKE Let me get up on the porch - get it in
there good. I can't reach it.
YOUNG I'll get it to you. There you go.
DUKE I got it.
YOUNG Okay, here's the UV cassette.
DUKE I got it. ALSEP baby works.
YOUNG I'll bring the ETB up now.
DUKE Okay, and you got a big rock bag you left.
YOUNG Yeah, understand. Get up there. Go.
CAPCOM And, John, verify that you took the
magazine off your camera.
DUKE Boy, you got that up fast.
YOUNG That's verified.
CAPCOM Okay, and the UV cassette is in the ETB.
YOUNG The UV cassette is in the spacecraft.
CAPCOM Okay, good show.
YOUNG I brought it up separately.
CAPCOM Okay, we're all for that.
YOUNG Go down and get the big rock bag now,
Charlie.
DUKE Okay.

END OF TAPE

DUKE Well, that's the last of the ol' orange juice junk -- just finished it.

CAPCOM Okay, we copy that.

YOUNG Makes the EGB stay closed.

DUKE Huh?

YOUNG Have to take it up open.

DUKE What the big rock bag?

YOUNG Yeah.

DUKE It won't -- there's no -- there's some snaps on it, but we'll get -- don't worry about that we'll get that later if you can bring it up open.

YOUNG Okay, I'm going to disconnecting the LEC and dropping it under the LM.

DUKE Okay, John, after I bring this in, wait 2 seconds and let me get behind the hatch and --

YOUNG I got it.

DUKE Okay, that's a big rock. Okay.

YOUNG Okay, Charlie's getting behind the hatch, Houston,

CAPCOM Okay.

YOUNG -- so I can get in that baby.

YOUNG Hung up on something.

DUKE Okay, I'm back as far as I can get, John.

YOUNG Okay, let me get my visor up here, then see what I'm doing.

PAO Charlie Duke is in the LM behind the hatch trying to make as much room as possible for Young to squeeze through the opening.

DUKE Okay, you got it coming great. You're going to have to come right a little bit -- left a little bit. Clear your PLSS.

YOUNG That's as far left as I can get, Charlie.

DUKE Okay.

DUKE Okay, it's clearing -- just made it.

YOUNG Okay, just about got it.

DUKE Okay. Let me get my bum out of your way. Okay, John's in, Tony.

CAPCOM Okay, that's good.

DUKE Okay.

YOUNG Don't close it, I forgot to turn off your feed water -- let me get your feet water.

DUKE Okay.

YOUNG Okay, yours is closed?

DUKE Okay, let me get yours.

YOUNG Okay.

YOUNG His run out, like I still have to get it, huh, Houston? Probably 20 minutes --

CAPCOM That's probably a good idea.

YOUNG (probably a good idea) Okay, feed water's off.
 DUKE Okay, start with the post EVA, John.
 YOUNG (garble) primary water (garble) that's closed. Hatch closed and locked.
 DUKE Okay.
 YOUNG Look at that.
 YOUNG Okay, it's closed and locked, Charlie.
 DUKE Okay. I'm going to get the -- if you can scooch over just to the right a little bit. Let me get this dump valve. Now. Okay, we're in AUTO.
 YOUNG Okay, AUTO.
 DUKE That's affirm on the aft on the over-head.
 YOUNG Okay, again repress to AUTO. There it is
 Circuit breaker 16 ECS cabin repress to close.
 DUKE Here we come.
 YOUNG Okay, (garble).
 DUKE Okay they are.
 YOUNG (garble)
 DUKE Yeah. It's off.
 YOUNG I think I got mine.
 DUKE Yeah, I'll get it.
 YOUNG Make sure -
 CAPCOM Okay, you had a 5 hour 40 minute EVA, and the back room sends out a great big outstanding!
 DUKE Thank you very much, Tony. They kept us going and thinking, so it was a two-way street.
 YOUNG Okay, cabin warning lights off, cabin pressure stable at 465 - (garble)
 DUKE We gon't have to -
 YOUNG We don't have to? Stand by the EV circuit breaker configuration.
 DUKE Okay.
 DUKE Mine is good. I'm going to put the suit fan Delta P and the suit fan cooling in.
 YOUNG Okay, suit fan Delta P and suit fan coling closed. (garble) lights out. (garble) Golf (garble)
 DUKE Turn up your (garble) so we can see this please. Okay, there they are.
 YOUNG Man, when you get those gloves off I don't know if you're ever gonna get them back on again.
 DUKE (garble)
 CAPCOM John, verify you locked the forward hatch.
 YOUNG Hey, I got one of them on.
 CAPCOM John, verify you locked the forward hatch.
 YOUNG The board hatch is locked.
 CAPCOM Okay.
 YOUNG But I don't now (laugh)
 YOUNG There's somebody out there that wants to come in.
 DUKE Are you trying to pull my leg down there?
 YOUNG (laughter)
 CAPCOM No, we sure don't want anybody to get in.
 YOUNG Yeah, that's right.

YOUNG There's 5,000 psi on that door. At least.
Phew! Standby safety on the dump valve.

DUKE Okay it is.

YOUNG (garble)

DUKE (garble)

PAO This is Apollo Control. The LM cabin
pressure reached 3-1/2 pounds per square inch after 5 hours
40 minutes 17 seconds of the third EVA. And we had John
Young back in the Lunar Module at 171 hours, 21 minutes.
The television will be left up for just a short period longer.
They're preparing to turn it off, it'll be brought back up
again prior to the LM liftoff tonight. We've just commanded
the television off. Everything looks good for the TV of
LM liftoff. The instrumentation and communications officer
reported that some of the temperatures were a little higher
than expected, but everything looked good. We expect that
the system will cool down now that we've got it off.

DUKE (garble)

END OF TAPE

DUKE That's the wrong one.
YOUNG Pitch in, Charlie. Back in?
DUKE Okay, huh?
YOUNG Make it?
DUKE Yeah, that's beautiful. (garble)
YOUNG Okay, (garble)
YOUNG (garble)
DUKE Okay, yours is on.
DUKE Okay, now we got to get the LM on 2 hoses.
YOUNG Hey, why don't you just get one water.
DUKE No, we got to take -- see we got to leave
it on.
YOUNG Okay, here. Right, right.
DUKE We got to depress right away. Okay. And
in locked.
YOUNG Okay, it would be a miracle (garble)
YOUNG Okay, got it finally.
DUKE Got it at under. Okay, let me get mine on.
YOUNG Okay, let me get it to lean over here.
(garble)
YOUNG Yeah, here you go, Charlie. Oop, here we
go.
DUKE Those things seem backwards to me.
YOUNG Sure are.
DUKE (garble)
YOUNG (garble) Okay. They're in locked.
DUKE Okay. Suit ISOL both going to suit
flow. Turn -- umm that feels good. Turn the pump off and the
fan off. Okay disconnect PLSS H2O from PGA, connect LM H2O.
YOUNG There goes yours. Take your water hose
and put it over here. It's almost spaghetti.
DUKE That thing's about 95 feet long, John.
Okay, I got it.
YOUNG Okay. Let me get your water.
DUKE Yeah.
YOUNG That yours?
DUKE No it's right here.
YOUNG Okay.
duke Okay, disconnect PLSS H2O from to off. On
rather. We open the CB then disconnect the LM comm. Okay.
DUKE Okay, Tony, we're going off comm for a
second.
CAPCOM Okay, and Charlie, when you get a chance
to, could you pull that MESA circuit breaker?
DUKE Okay. (garble) Audio circuit breaker is
closed. Squelch, VHF,B, LMP noise breaker open plus 1 and a
half. Audio CDR and LMP VHF A to receive. D to the OFF, RCS
PTT.
CAPCOM And when you get a chance up there the
major circuit breaker open.

DUKE Tony, go on high bit rate, over.
CAPCOM Stand by one. Did you catch that about the major circuit breaker?

DUKE It is open.

CAPCOM Okay, good show. No we can't handle high bit rate, now.

PAO This is Apollo Control at 171 hours 36 minutes. We're continuing to experience the noisy communications that we'd had to Orion on the lunar surface, due to the fact that we don't have the LM steerable antenna, the high gain more directional antenna and we're using the OMNI directional antennas on the lunar module. At about 173 hours or a little bit beyond that we'll be able to cover the landing site with the 210 foot dish antenna at Goldstone, California. And we'd expect the noise on the circuit to drop somewhat at that time. While the crew on the lunar surface, Young and Duke, have been busy with their 3rd extravehicular activity, Ken Mattingly has also been active aboard the command module, Casper, completed the plane change maneuver at 169 hours 17 minutes 39 seconds. Flight Director Don Puddy, who's been following the CSMs activities says that the maneuver was almost precisely as planned. 124.7 feet per second change in velocity, this was a 7 second burn with the spacecraft service propulsion engine. And changed the plane of Caspers orbit a little over 1 and a 3rd degrees and placing it in the proper position for rendezvous with the lunar module. The current CSM orbit is 65 by 55 nautical miles. For Ken Mattingly this is a relatively quiet revolution there letting him have a break from his scientific duties, getting the command module cleaned up and ready to go -- ready for the rendezvous and docking with Orion. And the subsequent large amount of material that will be transferred from the lunar module to the command module. The LM lift off is currently scheduled to occur at 175 hours 43 minutes 30 seconds ground elapsed time. We have about 48 minutes left before we lose radio contact with Mattingly in the command module and he's now coming up approaching the Descartes landing site, he'll be passing over that in the next few minutes. At 171 hours 39 minutes this is Apollo Control, Houston continuing to monitor activities aboard Orion on the lunar surface.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 3:21 GET 171:39 654/1

ORION Okay, Houston, Orion. We've performed the OPS checkout. And they are both good. John's OPS is reading 6090 6200. Over.

CAPCOM Okay, we copy that.

PAO This is Apollo Control at 171 hours 47 minutes. Flight Director Pete Frank has been reviewing the status of the lunar module, particularly in preparation for lift off. And the report comes back all around that the LM looks very good at this time. We still have adequate margins of water which is used primarily for cooling the electronic equipment in the descent stage supplies. And all of the so called consumables, electrical power, water, and so on, aboard the ascent stage, also look very good.

END OF TAPE

DUKE What are you doing with a (garble) of spaghetti there?
YOUNG Cabin's clear.
DUKE (garble) Well, we've got to get these return items out of here. Stow in the ISA big pockets.
DUKE There is surely not anything in there but the shovel.
DUKE Yeah, I don't think it's necessary to put that back in the sack. All they're doing it for is weight weight. You don't have to (garble) (garble) buddy PLSS rock bag, and collection bag then we'll go with -
YOUNG Push your big rock away -
DUKE 65 pound mack is supposed to be 35 50
DUKE John.
YOUNG Yeah, number 7.
DUKE We can get one rock in there.
YOUNG We can?
YOUNG (garble)
DUKE Get that one in there, that one will go in too.
YOUNG That one will go.
DUKE That's all we put in?
YOUNG Baby rocks, well let's call it 42, 43 they'll let us go with that I'll bet you. (Several garbled words) bag 70.
DUKE Huh?
DUKE Houston, Orion, over.
CAPCOM Go ahead, Charlie.
DUKE Okay, we've got some weights for you if you're ready to copy.
CAPCOM All set.
DUKE Okay, the BSLSS rock bag the big rocks will weigh 40 pounds, bag 7 SPB number 7 is 33 SPB number 4 is 25 SPB number 6 is 20, I get a total out of that of about 118, over.
CAPCOM Okay, we concur.
CAPCOM Okay, we're working those numbers over here.
DUKE Okay, Tony, we've got a weight saver for you the ISA only weighs 10.
CAPCOM Okay, ISA weighs 10.
DUKE Actually it weighs 8 pounds.
CAPCOM Okay 8.
DUKE Make that 8.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 15:41 GET 171:59 656/1

CAPCOM Hey, fellows, you have 245 pounds of rock.
CAPCOM That's not including the weights or the SRCs.
ORION Okay, has some got to go back.
CAPCOM Naw, I think we're going to be able to
find a way. You got an in plane launch, so things look pretty good.
But we're working it here.
DUKE (garbled)
YOUNG Probably throw that big one away.
DUKE Yeah.
YOUNG It's getting to the point where we got
to know - -
DUKE Say again.
YOUNG We'll probably have to throw away that big one.
YOUNG Okay.
YOUNG Well, we don't want to throw away any --
any that don't need to be thrown away. That's for sure.
YOUNG Well, I tell ya, there's a couple more
pounds up here we missed.
CAPCOM Say again, John.
YOUNG I say, there's a couple of tons up here
that we didn't take out.
CAPCOM Okay, Dynamics, thank you very much.

END OF TAPE

ORION Houston, we're about to the point (Garble).
Jettison bag.
CAPCOM I'm sorry Charlie - John say again.
ORION Roger, we ready to try for jett bas.
CAPCOM Okay, we're still trying to get a decision
on these rocks down here if you could hold on one.
ORION They're only good for launch.
ORION (Garble). (Garble) it is.
ORION Tony, if it helps you out, this morning
we jettisoned the CWG, the LCGs all of the (garble) and everything
like that. That was a pretty big bag.
CAPCOM Okay.

END OF TAPE

CAPCOM Okay, Orion, we're go with the rocks you
got.
YOUNG Outstanding! Thank you very much.
YOUNG Okay, we're going to press on with the -
(garble)
DUKE Hey, Tony, (garble) how do you read?
CAPCOM 5 by Charlie.
DUKE Okay. Get the (garble) gloves now.
CAPCOM Okay.
YOUNG (garble) It feels like it snaps at the
bottom
DUKE Twist it over. (garble)
YOUNG (garble)
DUKE (garble) take my hat off slowly -- let's
try it --
YOUNG That sounded like these little -- (garble)
YOUNG Take your hat off (garble)
DUKE Okay. I'll do it, you got your own to do.
(garble)
YOUNG (garble) never get your hat back on. (gar-
ble)
DUKE I'll hold that now.
YOUNG Okay, Houston, give me a towel I was
just kidding.
CAPCOM Say that again, Charlie, please?
DUKE Con-
YOUNG Go ahead.
DUKE We got a problem with a connector to (gar-
ble) we're going to have to take them off and blow the dirt
out of them to get them open and closed.
CAPCOM Okay, we copy.
YOUNG We're going to have to take our helmets off
to do that.

PAO This is Apollo Control at 172 hours 24
minutes. That was John Young reporting that they have a
problem with dirt in connectors. He's advising us that they
plan to remove their helmets so that they can blow the dirt
out of the suit connectors. And get everything
fitting in tightly. At the present time Young and
Duke are getting the cabin back in order, getting equipment
stowed, and preparing to jettison equipment that they will
not need further -- such things as the portable life support
systems. They'll open the hatch and deposit this unneeded
equipment on the Lunar surface. That time in the flight
plan is around 172 hours 30 minutes. We're running a little bit
behind. It'll probably come out closer to 173 hours. And
at the present time Ken Mattingly aboard the CSM Casper is
nearing the end of his 50th revolution of the Moon. We're
just about to lose radio contact with that vehicle. It's
been a quiet revolution for Mattingly. Flight Director,

PAO Don Puddy, advised that this period had been intentionally left open so that Mattingly could get the Command Module cabin in order to receive all of the rocks and other equipment from the Lunar Module, including the two passengers. And also to get everything set up for the rendezvous and docking, which will occur on the 52nd and 53rd revolutions of the Moon. As we mentioned previously we do not expect to get television of the docking. This was originally scheduled, however, it has to be dropped because of the fact the Lunar Module steerable antenna is not working. With this situation it becomes necessary for the Command Module while the two vehicles are operating separately and in close concert such as they will be during the rendezvous and docking procedures. It becomes necessary to operate the Command Module with its OMNI directional antennas, rather than with the high gain antenna, so that we don't block the receivers at the Manned Spaceflight network station while we have one vehicle operating with a much greater signal strength than the other as we found out prior to the landing. We tend to get better saturation in the receivers in order to keep this balance proper and to avoid that sort of problem, the two vehicles will be operated in a rendezvous and docking stage using comparable signal strengths and comparable antennas. And we therefore will not be able to get the television. The signal strength will simply be too low for a good television transmission.

END OF TAPE

ORION (garbled)
ORION Mine is to.
ORION 6.05.
ORION It's amazing.
CAPCOM Okay, Orion. Mark.
ORION Say, mine went down about 1.15.
ORION Okay, Houston. Mine went down about .15.
circuit likks going auto. We're coming down.
PAO Young and Duke have completed the pressure integrity checks on their suits, after removing their helmets blowing out the connectors and got them back on. Completed those pressure integrity checks and are now going to go ahead and proceed with the depressurization of the cabin in preparation for opening the hatch and jettisoning any unneeded equipment.
ORION Where's your (garbled) John?
ORION It's up here. I don't know --
CAPCOM Okay, and when you are ready, go for depress.
ORION Roger.
ORION Okay, we're GO for depress, Charlie.
ORION Okay.
ORION Circuit breaker 16 G?
ORION Check, cabin depress open, Okay, it's open, overhead overboard dump valve open and in auto, getting water through it.
ORION (garbled) in auto at 3 and a half. Can you hear me okay?
ORION Keep missing a little bit.
ORION (garbled)
ORION There it's on auto.
ORION Open
ORION Coming down.
ORION Auto at 3.5. Give me the hatch.
ORION 39 38 35 stay closed. Okay. Pressure locked up before (garbled) 4.4.
ORION Okay. Look at it for a minute.
ORION Yeah, let's look at that one. Hold off.
ORION Okay, here we go. (garbled)
ORION Houston, depress.
CAPCOM Okay.
ORION (garbled) There's one (garbled)
ORION Off.
ORION Get down to 10, why don't you try (garbled)
ORION They're (garbled) (laughs)
ORION (garbled) go.
ORION Charlie, do what (garbled)
ORION Okay, then we go to auto (garbled) it's in auto.
ORION Okay, auto. Check.

ORION Hello
ORION (garbled)
ORION Kick. Got it. Cleared for the ground.
ORION (garbled)
ORION You kicked that one plum off the step.
ORION It does.
ORION All clear, John.
ORION Okay, jettisoned the following PLSS, PLSS
clear.
ORION Clear.
ORION Clear and closing down the hatch.
ORION Jettison complete, Tony.
CAPCOM Okay, we copy that.
PAO This is Apollo Control through the noise
we copied jettison is complete. The crew now will be closing
up the hatch and are getting the LM repressurized.
ORION Repressurization switch is in auto. Here
we go. Circuit breaker is coming in.
ORION 79 (garbled) Charlie (garbled)
ORION When it starts increasing.
ORION (garbled)
ORION Huh?
ORION (garbled)
ORION Cabin.
PAO And we're watching the LM cabin pressure
coming up rapidly now. Up to 4.4 pounds per square inch. It
will level off a little below 5.
ORION (garbled) 5.
ORION Have the depress off. Cabin pressure alright
4.6.
ORION (garbled) just like -(garbled)
ORION (garbled)
ORION I get it.
ORION 8

END OF TAPE

YOUNG (noise)
YOUNG Okay, hang on.
DUKE Same problem I've got. Here let me help.
DUKE Why don't you try mine.
YOUNG Garbled sentence.
DUKE We've seen that before. That's on the heater I think.
YOUNG What?
DUKE Huh?
YOUNG What? We've got to move those things.
DUKE Well I don't have anywhere to move them.
YOUNG (garble) Hurry Charlie.
DUKE Huh?
YOUNG (garble) (garble)
DUKE Ah, do you know what it was? Orange juice.
Orange juice. Your's is the same way.
YOUNG Get those bags out of there.
DUKE Okay, Houston read us okay?
CAPCOM Yeah, we read you fine, Charlie.
DUKE Okay, we had one heck of a time getting our helmets off, it turns out that this orange juice is the best cement you'd even seer. It leaked down in between the seals and the helmet and the ring and we couldn't get the thing unlocked without a great effort but we managed we're both out now.
CAPCOM Well, we may have a new market for orange juice, glue.
DUKE Yeah, we'll clean them off before we redock here. Okay verify safety. Okay, we've got to stow those helmets - helmet bags. I want to clean mine off first though. I need it really. Okay, Tony we're going to go out (garble) it'll be about 10 minutes cleaning up these helmets.
CAPCOM Okay.
PAO This is Apollo Control at 172 hours 44 minutes. That was Charlie Duke reporting that the orange juice which is carried in a bag in the neck ring of the suit allows the crewmen to get a little bit of liquid refreshment during the EVAs as they have reported periodically during the EVAs, during the time they were suited, has leaked out and had apparently gummed up the ring where the helmet seals to the suit and Duke said it required quite a bit of effort to get the helmets off. As he described it it kind of gummed things up and that the orange juice when it got in there and apparently dried was quite a good glue. On that third EVA, today, the crew total distance traveled was about 9.85 kilometers. The total EVA time was 5 hours 40 minutes 17 seconds and our estimate on net weight of lunar samples, totaled from the three EVAs as passed up by Tony England to the crew is 245 pounds. We expect to acquire the lunar module Orion through the Manned Spaceflight Network Station at

PAO Goldstone, California, where we have a 210 foot dish antenna. We're presently in contact through the 85 foot dish antenna at Madrid, Spain, and we expect when we go to the larger antenna which is the arrangement we'll be using for LM liftoff, that the communications will improve somewhat. We have about 27 minutes remaining before we reacquire Ken Mattingly in the command module, Casper and at that time he'll be on his 51st revolution of the Moon. Flight Director Pete Frank has reviewed the status with his flight controllers, everything looks to be in order for the LM liftoff subsequent rendezvous and docking. And also aboard the CSM Casper at last report, everything was in readiness for the rendezvous and docking. Liftoff for the lunar module is scheduled for 175 hours 43 minutes 30 seconds. We expect some small update in that time, however, it shouldn't change more than a matter of a few seconds.

END OF TAPE

CAPCOM And Orion, Houston. We have your bag storage whenever you want it.

ORION Okay, thank you Tony (garble) yet.

CAPCOM Okay.

ORION Okay, Houston we're going through the service checklist.

CAPCOM Okay.

PAO This is Apollo control. We're in the process of completing our shift handover at the present time. Flight director Gene Kranz and the white team of flight controllers coming on to replace Pete Frank and the orange team for the lunar module. The flight director for the command module will be Phil Shaffer replacing Don Puddy at that position. And our capsule communicator at the moment is still Anthony W. England. Dr. Tony England was the capcom also during the EVAs. And we presume will be relieved shortly, although he's still holding down those duties. And the capcom for the command module is Astronaut Henry Hartsfield. We're planning to have a change of shift press briefing in about 15 or 20 minutes. Best estimate is probably for about 5:00 p.m.

END OF TAPE

DUKE Okay, Tony, Orion, here. We've got the SCBs and the sample containment bags, 7 is in 7, 6 is in 6, 4 is in 8, over.

CAPCOM Roger, Jim's on now, Charlie, give me those bag numbers again, please? We have some information for that weight summary for you.

DUKE Okay, SCB 7 is in sample containment 7, SCB 6 is in sample containment 6, SCB 4 is in sample containment 8, over.

CAPCOM Okay, and I have some information for the bottom of the clutch and bag stowage, for you. You don't have that information?

DUKE No we don't go ahead.

CAPCOM Okay, we want bag 7 of course in cover 7, next line bag 4 and then the next line there is bag 5, and the RH SSC. Bag 4 in the LH SSC and cover 8. The next line is 3 and then 6 in cover 6. Over.

DUKE Boy, you lost me, Jim. Give me the sample containment bag numbers, that's all I need.

CAPCOM Okay, at the summary on the collection bag stowage down below, in those blanks, first blank

DUKE Rog.

CAPCOM -- bag 7. The next line there is bag 4. The next line there we want number 5 in the right hand side number 8 in the left hand side and the next line down we have 2 blanks it's 3 and 6. Over.

DUKE Okay, got you.

DUKE John.

CAPCOM Orion, Houston.

YOUNG Go ahead, Jim.

CAPCOM Just a reminder, we'd like you to get the LGC and IMU UV powered up. Should have had that done about 15 minutes ago. That's page 7-9.

YOUNG Okay, that didn't work.

END OF TAPE

PAO Apollo control Houston. 173 hours 19 minutes ground elapsed time. We've completed our shift change over at mission control. Our flight director now, Gene Kranz, leading his team of controllers and at the capcom console at this time Astronaut Jim Irwin talking with Orion and Astronaut Hank Hartsfield dealing with Casper. We're at 173 hours 19 minutes. And this is Apollo control, Houston.

CAPCOM Orion, let's go high bit rate.

ORION Okay, Houston - Okay, Houston we're running the computer check now.

CAPCOM Okay, Orion this is Houston.

ORION Go ahead, Jim.

CAPCOM Roger, for your reference if we can just add 4 hours to all the times listed in your checklist there you will be very close within 1 minute for your timing purposes.

ORION Okay, just as soon as we get a clock running, we'll be more than happy to do that.

CAPCOM Okay, the only thing we're anxious to have you do now is the LGCI new power up.

ORION That's in work.

CAPCOM Roger.

ORION Okay, you want your E memory dump.

CAPCOM Stand by. We don't have data yet so stand by.

ORION Okay, the computer test is successful. And we're holding for your dump.

CAPCOM Okay, we're standing by until we get data.

ORION Okay.

ORION You must have a big dish or something as you're clear as a bell.

ORION Hey, Jim don't feel - we don't have any idea what time it is. Be our quest on helping us out on where we should be in the timeline.

CAPCOM Okay, we're at about 173:23 and we're ready for your E memory dump.

ORION On the way.

CAPCOM Okay, if you'll go to data we'll send an uplink.

ORION You have it .

CAPCOM Roger.

CAPCOM And Orion this is Houston. I have some changes to your the range and range rate after insertion whenever ya'll want to copy it.

PAO This is Apollo control, Houston at 173 hours 27 minutes ground elapsed time. At this time we'll take the line down as we prepare to start the change of shift news conference. We're at 173 hours 27 minutes. This is Apollo control, Houston.

END OF TAPE

PAO This is Apollo Control, Houston, at 174 hours 2 minutes ground elapsed time. We did have conversations in mission control with Orion, which we will play for you now.

ORION That first time line looks right, Jim.

CAPCOM Yeah, that's the first portion there, you know after insertion. That little square or box up on the left hand corner.

ORION Yeah. Know it well. Okay, Jim go ahead.

CAPCOM Okay, at insertion, I'll read range and then range rate. Insertion 171.0 minus 492, at 1 minute 166 minus 490, 2 minutes 161 minus 486, 3 minutes 156 minus 482, 4 minutes 152 minus 478, 5 minutes 147 minus 472, 6 minutes 142 minus 467, 7 minutes 138 minus 461, 8 minutes 133 minus 454, 9 minutes 129 minus 447, 10 minutes 124 minus 439, and at PPI minus 10 minutes should be 44 and minus 155, over.

ORION Okay, we copy starting at insertion, 171 minus 492, 166 minus 490, 161 minus 486, 156 minus 482, 152 minus 478, 147 minus 472, 142 minus 467, 138 minus 461, 133 minus 454, 129 minus 447, 124 minus 439, PPI minus 10, 44 minus 155.

CAPCOM Good readback, Charlie.

CAPCOM Okay, Orion, the computer is yours.

ORION Okay. Boy, that's nice, that's the first time in 3 days we've known what time it is. 173:30 224, Huh?

CAPCOM Roger, we're glad to see you guys get on time. You've done pretty good without a clock. Okay, Orion, this is Houston, I have the lift off time for your P-57.

ORION Okay, just a second, Jim.

CAPCOM Okay.

ORION Okay, go ahead with it.

CAPCOM Okay, lift off time, 175:43 35.18. Over.

ORION 175:43 35.18.

CAPCOM Good readback. And Orion we're just standing by for your P-57.

ORION Hey, is that a good P10.

CAPCOM Stand by. Okay, P10 looks good.

ORION Okay.

CAPCOM Orion, this is Houston, Casper is going to try the VHF check here shortly.

ORION Okay. Okay, we're on VHFA to receive.

CAPCOM Roger.

ORION Is he on A-simplex, Jim?

CAPCOM Stand by. Okay, John the configuration for--

ORION - - copy those angles.

CAPCOM Stand by.

CAPCOM Caspers trying to call you now on the configuration is on 7-12, on your check list. Okay, we copy the angle.

ORION Okay, Casper, this is Orion, how do you'
 read, over.
 CAPCOM Okay, Orion, Casper is reading you.
 ORION Okay, I'm not reading him.
 CAPCOM Orion, verify that the B recievers ON.
 CAPCOM Okay, Casper, how do you read, over.
 ORION Rog. we read you 5 by, Ken. We won't
 squeal.
 ORION How's things up there?
 CASPER Good show.
 ORION Houston, how do you like this torquing
 angle?
 CAPCOM Stand by. Okay, we copy the angle.
 ORION Okay, then it parts at 153 49 15.
 CAPCOM Roger. Orion, lets go low bit rate.
 Orion, this is Houston, verify rendezvous radar breakers are
 closed for the antenna position.
 ORION Yeah, it's in works.
 CAPCOM Thank you.
 CAPCOM Orion, this is Houston, with a change for
 your surface check list.
 ORION Okay, go ahead, Houston.
 CAPCOM Okay, it's on page 8-16. We want you to
 close system A main SOV, prior to system A SMC 2 open. Over.
 ORION Okay, understand. Say again, what page
 it's on.
 CAPCOM That's 8-16, just before you open the SMC
 we want you to close system A main SOV.
 ORION Okay, close system A, shut off valve, just
 before opening the SMC.
 CAPCOM Roger.
 ORION Jim, can you give us some words about system
 A?
 CAPCOM Stand by, Charlie. We'll get a story for
 you. In the mean time, perhaps while you're grabbing a bite
 to eat, I've got a lot of time line up--changes, if you'd
 like to eat while I read them up to you?
 ORION Could you stand by a minute we've got a
 couple of more stowage items to do.
 CAPCOM Okay, just let me know when you;re ready.
 And Orion, I have the ascent pads also, when ya'll are ready
 to copy.
 ORION Okay, Jim, it'll be -- if you can hold
 off for 10 minutes or so I'm going to put the OCSs on the
 floor now.
 CAPCOM Okay.
 ORION Okay, Jim, I'm ready for the ascent pads.
 Over.

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 17:45 GET 174:03 MC-664/3

CAPCOM Okay, Charlie, I'll give you the direct
pad first and I'm reading, 175 43 35 18, I'll verify that one.
Next line 552 52 00 320 plus 0002 plus 377 62 minus 76 550 plus
58 556 plus 57 018 plus 00 320 plus 03 979 176 37 52 00 LM
weight 10945, TIG 1 REV late 177

END OF TAPE

CAPCOM 39 79 176 37 52 00 LM weight 10 945 TIG one rev late 177 42 06 and the CSM orbit is 65 by 55, over.

DUKE 55 by 65 Okay readback direct. 175 43 43 18 55 252 00 320 plus 000002 37762 36 550 58 556 57 018 and the 053 was a minus 76 550 231 57 018 00 320 03979 176 37 52 00 LM weight 10945 CSM orbit 650 550 one rev late 177 4206 Over.

CAPCOM Okay, the seconds on TIG is 3518 and (garble) 53 is minus 76550, over.

DUKE Yeah, I got that minus 76550 and the TIG is 43 35 18.

CAPCOM Good readback. And now I'm ready for the coelliptic. Could we get a 5 bit rate first Charlie?

DUKE You got it.

CAPCOM Okay, on the coelliptic. 175 46 09 37 552 35 00 390 plus 0002 plus 37762 minus 7655 zero plus 585 19 plus 57 018 plus 00 390 plus 04046 EPI NA over.

DUKE Okay, copy 175 46 09 37 55235 00390 0002 37762 minus 76550 58 519 57 018 00390 04 046 EPI and the rest is NA.

CAPCOM Good readback and here's the P32 CSI pad 176 44 33 91 178 37 all zeroes 0571 plus all zeroes 04046 05170 plus 0571 that's all zeroes plus 0013 over.

DUKE Okay, Jim, I need the noun eleven CSI TIG seconds and everything after Delta V Y

CAPCOM Okay, NOUN 11 seconds it's 3391 over.

DUKE Right, and start with Delta V Y and read the rest of the pad.

CAPCOM Okay. Starting at Delta V Y plus all zeroes 04046 05170 plus 0571 plus all zeroes plus 0013 over.

DUKE Okay, I got it this time. 176 4433 91 17837 0000 plus 0571 plus all balls plus 04046 plus 05170 plus 0571 plus all balls plus 0013 over.

CAPCOM Good readback.

DUKE Okay, we're ready for the time line update.

CAPCOM Okay, I'll read it. Most all of these items occur after docking so if we run into any time problem why we'll just break it off and pick it up there when ya'll come around the corner.

DUKE Okay. Jim, we got all our stuff stowed. We're sittin' here gettin' a bite to eat. And if we're to gather we're at liftoff minus 115 in the checklist.

CAPCOM Okay. We're showing about 129 here, so you got about 15 minutes if you want to spend that time copying exchanges.

DUKE I'd rather spend it eating. I haven't even started yet. If you can hold off on that.

CAPCOM Okay, why don't ya'll get something to eat. And Charlie, we can read these things to you real time after docking.

DUKE That sounds best. Thank you. Yeah, Jim, it does look like you can't quite do all of that stowage as fast as we planned it. You probably know what I mean. Uh, we look pretty presentable now though Jim, an hour ago I wouldn't have given two shakes though.

CAPCOM In other words you're on time now, and you're all stowed.

DUKE Yeah, we're all stowed. We're grabbing a quick bite.

CAPCOM Okay, that's good. Okay, Orion, this is Houston with some words on your RCS. At the present source pressure of 1200 psi, you've got 44% system A. If you should lose that pressure, in other words, a blow down mode you'll have 38%. Over.

DUKE Right, sounds great. Thank you. Jim, I passed on into the back room that that gillie rock weighed 40 pounds.

CAPCOM You're saying 40 pounds. Hate to tell ya, but the back room is all at the tube.

DUKE Either that or 140. It's a big rock!

PAO This is Apollo Control, Houston, at 174 hours 20 minutes ground elapsed time. For Orion's ascent burn into orbit, Mission Control is looking at the following data. Time of ignition 175 hours 43 minutes 35 seconds. Duration of the ascent burn 7 minutes 16 seconds, 60 000 feet in altitude at shutdown. Velocity of 5525 feet per second at shutdown. Orbit at insertion for Orion an apolune of 41.1 nautical miles with a perilune of 8.9 nautical miles. Orion should be about 160 nautical miles down range from it's Descartes station at insertion. We're at 174 hours 21 minutes ground elapsed time. We will follow the air ground conversation live as it occurs. This is Apollo Control Houston continuing to monitor.

END OF TAPE

CAPCOM (garble) Orion, this is Houston, I have a basic plan here for post-docking if y'all can listen to the reading.

YOUNG Okay Jim, go ahead.

CAPCOM Okay, number one is you'll doff suits in the LM, item 2 is postpone some of the LM transfer until post-sleep. Of course the changes that I'll read up to you will take care of some of that. Then item 3 is we'll power down the LM and dry out the water boiler. Item 4 be ready to close out the LM at 179 20 that's AOS (garble) plus 10 minutes. Next pass after docking, then item 5 you'll re-enter the LM tomorrow and transfer completion and LM jettison. Item 6 you will need the LM timeline book and LM contingency check list at docking to accomplish deactivation, over.

YOUNG Okay, understand.

CAPCOM Okay. And add AOS there we have about 25 minutes to read you the changes if we don't get them to you while you're on the surface.

YOUNG Okay.

DUKE Okay, Jim, we're starting in our launch prep.

CAPCOM Roger, understand launch prep.

PAO This is Apollo Control, Houston at 174 hours 29 minutes ground elapsed time. For Orion's terminal phase insertion or initiation burn over the far side of the Moon, following insertion we have these numbers: TPI ignition 176 hours 37 minutes 52 seconds; predicted velocity - Delta v of the burn 80.8 feet per second, Orion's resulting orbit 65.2 nautical miles by 40.6 nautical miles. The command module Casper presently in an orbit of 65 nautical miles by 55 nautical miles. This is Apollo Control Houston.

CAPCOM Orion, this is Houston, when you power up AG, we have a couple of more quantities that we'll be asking you to read out for verification.

ORION Okay.

END OF TAPE

ORION Okay, Jim, I've got the AGS up. I'm at
7 on page 84.
CAPCOM Okay, we see it.
CAPCOM Before you do the 400 plus 6 at the bottom
of the page, we'd like you to read out address 537 and 640.
ORION Okay. 537 is minus 77 752.
CAPCOM That's good.
ORION Did you give me any other one?
CAPCOM 640
ORION 640 is plus 00 004.
CAPCOM Good. Thank you.
PAO Apollo Control Houston at 174 hours 35 min-
utes ground elapsed time. That was Lunar Module Pilot --
ORION The rise in the temperature is 895. Want to
go ahead and do the radar test?
CAPCOM Standby.
CAPCOM Roger. Let's go ahead.
PAO That was Lunar Module Pilot first Charlie
Duke checking out the backup guidance system. We then heard
from Commander John Young. We're at 174 hours 35 minutes. This
is Apollo Control Houston.
ORION Jim, you got 148 GC, (garbled) power 34,
(garbled) 65, circuit air is 65.
CAPCOM Orion, this is Houston with a late change to
your time line at TEG minus 2.
ORION Okay, go ahead.
CAPCOM Roger. We want you to eliminate the line
there audio, mod to VOX. We want you to say, stay ICSPTT
for the descent stay in your present COM configuration
of down voice back up.
ORION Okay.
PAO Apollo Control Houston now 174 hours 37 minutes.
We've been looking at the radar self test here in Mission
Control. It is checking out well. We are at 174 hours 37
minutes. This is Apollo Control Houston.
ORION Okay, I'll pass it down, if that's okay?
CAPCOM Say again, John?
ORION (garbled)

END OF TAPE

CAPCOM Say again, John.
ORION (Garble). You got a new LM weight for us?
CAPCOM Yeah, I thought I gave you one on the
ascent pad.
ORION Yeah, we got it.
CAPCOM Orion, this is Houston. We're standing
by for your hot power check if you want to move on.
ORION Okay, that's what we're doing.
CAPCOM And we're showing about an hour from
liftoff.
ORION Rog.
CAPCOM Charlie, when you get a chance we need
your 554 through 6 readouts. I see you got them now.
ORION Roger, Jim the readouts. Stand by.
Okay, before we started the cal they were minus 116 plus 052
minus 068 that's in the cal minus 113 minus 064 minus 064, over.
CAPCOM Update of the star values are minus 116
plus 052 minus 068 and afterwards they are minus 113 minus 064 and
minus 064.
ORION That affirmative.
CAPCOM Okay, Charlie will you read out 545 again
for us.
ORION Right. minus 0 - okay wait a minute
okay it's plus 060 excuse me.
CAPCOM Okay, we have it.
ORION Okay verb 11 now.
CAPCOM And Orion, I have a K factor for you if your
ready.
ORION Okay, Jim ready for the K factor.
CAPCOM Roger, plus 00170 plus all zeros plus 00004,
over.
ORION Rog, 17000 plus 00004, and do you have
an uplink for us before we start in the P57?
CAPCOM Stand by. Okay if you'll go to data
we'll send you an uplink.
ORION Okay, you have it.
CAPCOM Roger.
PAO P57 is a program in which the crew aboard
Orion will have their lunar surface alignment for the guidance
system. We're at 174 hours 48 minutes ground elapsed time.
This is Apollo control, Houston.
CAPCOM Okay, Orion we're finished with your
computer.
ORION Roger.
PAO Apollo control, Houston 174 hours 51 min-
utes ground elapsed time at minus 52 minutes flight director
Gene Kranz advising his team that we're about 7 or 8 minutes
ahead of the timeline. He says it's the way he likes to have
it and keep cool. We're at 174 hours 51 minutes ground elapsed
time. This is Apollo control, Houston.
END OF TAPE

CAPCOM . And Orion, this is Houston, hot fire
check looks good down here.
ORION Sounds good up here, too.
CAPCOM Roger.
ORION Those beauties are rock crystals spacecraft
Jim.
CAPCOM Very good.
PAO That was Capcom Jim Irwin reporting
on the RCS attitude thruster firing checkout; he was
speaking with Commander John Young aboard Orion. We're
at 174 hours 53 minutes continuing to monitor, this is
Apollo Control, Houston.
PAO This is Apollo Control, Houston, at
174 hours 57 minutes ground elapsed time watching the
onboard computer aboard Orion. We see the crew Commander
John Young and Charles Duke flashing up their VERBS and
NOUNS, going through the lunar surface align program, now.
ORION (garble) Jim.
CAPCOM Roger, we have it.
ORION Okay, we're going to torque.
CAPCOM Roger.
ORION Mark at 174 57 52.
ORION Jim, you want us to bring ascent
batts on or wait till about 35 minutes.
CAPCOM Stand by. Okay, you can go ahead
and bring them on Charlie.
ORION Okay.
CAPCOM Okay, Orion, I have an 047053 value
for you.
ORION Okay, stand by. Go ahead.
CAPCOM Okay 047 plus 3 7762 053 minus 76552, over.
ORION Plus 3 7762 minus 76552.
CAPCOM Good readback. And Orion, this is
Houston, as far as we can tell, there'll be no dup ups
or gyro updates for you.
ORION Excellent.
CAPCOM Orion

END OF TAPE

CAPCOM Orion, this is Houston on that rendezvous radar position. We saw a plus 33 instead of 33300 over.

DUKE Hey, Jim, I slewed the thing up through the optics all the way so it's looking at me. Is that alright?

CAPCOM Okay, it's fine Charlie. Thank you.

DUKE Hey, Jim, we loaded your LM ascent weight but I think the DAP is limited to 10900 'cause it comes back up 10900 everytime.

CAPCOM Alrighty.

CAPCOM Orion, this is Houston. For your information your total EVA time was 20 hours 14 minutes 55 seconds.

DUKE Gee whiz. That's not bad for a three rev slip, huh"

CAPCOM Very good, Charlie.

PAO This is Apollo Control Houston. That was Lunar Module pilot Charlie Duke responding "that's not bad for a three rev slip." We're at 175 hours 6 minutes ground elapsed time, continuing to monitor. This is Apollo Control Houston.

CAPCOM Orion, this is Houston. 10900 is the max you can load into the DAP.

DUKE Roger.

DUKE Okay, Houston, we selected suit band one.

CAPCOM Okay.

PAO This is Apollo Control Houston 175 hours 8 minutes ground elapsed time. The crew aboard Orion are now in program 12 -- computer program 12. This is the power ascent program. They, like Mission Control, counting down for time of ignition. And we presently read on their computer 35 minutes 5 seconds.

DUKE Okay, Jim, we're on 8 12 waiting to don our helmets and gloves in about 20 minutes.

CAPCOM Roger, we're following you.

DUKE Jim, what does (garble) say on our consummable status?

CAPCOM Roger, you look great on consummables. Actually, you have about 18 hours left on your electrical and about 10 more pounds of water. Over.

CAPCOM Would you like to do a fourth EVA?

DUKE Alright, thank you.

DUKE If you'd let me sleep, I wouldn't mind.

PAO This is Apollo Control Houston at 175 hours 11 minutes ground elapsed time. We've just acquired data --

DUKE Alright. Houston, our AGS lunar align appears to be about a quarter or a half degree off the

APOLLO 16 MISSION COMMENTARY 4/23/72 175:03GET 18:45CST MC-670/2

DUKE
CAPCOM
YOUNG
DUKE

PGNCS
Roger, we copy.
What axis is that, Charlie?
It's in pitch. I'm reading about --

END OF TAPE

CAPCOM What axis is that, Charlie?
ORION It's in pitch, I'm reading about - in AGS almost 2 degrees. When I switched to PGNCS it slipped down about - take that back it's only about a quarter degree, Jim between about 1 and three quarters and 1 1/2.
CAPCOM Okay, it's normal Charlie and I'll be in agreement at liftoff.
ORION Thank you. Oh, that's right I forgot about that.
PAO Apollo control, Houston. We're now acquiring data on the command module Casper on its 52nd revolution around the Moon.
CAPCOM Casper, this is Houston. How do you read?
CASPER Loud and clear.
CAPCOM Okay, the LM is right on the timeline, in fact quite a bit ahead. You can terminate your cabin build up at the present time.
CASPER Okay, I've already done that.
PAO Apollo control, Houston 175 hours 14 minutes ground elapsed time. We have Casper and Orion back on a single loop now. Our capcom is Jim Irwin.
ORION Jim, that has 500 feet to go on terminating the ascent B. Do you want that just nominally - done nominally?
CAPCOM It's nominal except for that change we read up to you about closing system A main SOV before you open the ascent B.
ORION Okay fine, thank you.
CAPCOM Orion, this is Houston. You can expect a roll moment offset due to the PG change at lose of RCS system A and then at 500 feet to go when you open the main shutoff valve you can expect a RCS warning at that time, otherwise it'll be nominal procedures during ascent.
ORION Orion, roger.
ORION Okay, Jim we got a RCS caution light and RCS A REG light on right now.
CAPCOM Roger.
ORION Our quantity and system A read 0.
CAPCOM Okay, it should read that.
ORION What we figured, thank you.
CAPCOM Orion, let's go biomed left.
ORION Roger, you have it.

END OF TAPE

PAO Apollo Control, Houston, 175 hours 21 minutes ground elapsed time. We show Casper in an orbit of 65 nautical miles by 54.6 nautical miles. Continuing to monitor, this is Apollo Control, Houston, with our countdown clock showing 22 minutes away now from time of ignition.

ORION Okay, Jim, we're suited, we're going to - - it's on the ascent H2O.

CAPCOM Roger. Casper, we want you to go wide beam width.

PAO This is Apollo Control ---

ORION Okay, Houston, we've got the vents open and (garble) back to gray. REFSMMAT going open now.

CAPCOM Roger.

PAO Apollo Control, Houston, now 175 hours 23 minutes, ground elapsed time, in the mission control center we are now configuring for lift off.

CAPCOM Orion, this is Houston, recommending PGNCS for the direct rendezvous.

ORION Understand PGNCS for the direct rendezvous.

ORION Say, Houston, can I take DACs 2 and 4 off now?

CAPCOM Roger, we're ready.

END OF TAPE

CAPCOM Orion, we'd like cabin gas return in egress.
PAO Apollo Con--
ORION Roger. It's in egress.
PAO Apollo Control Houston now 175 hours 31
minutes ground elapsed time. 11 and a half minutes away from
time of ignition. Flight Director Gene Kranz said - has just
advised Mission Control that Orion is GO for pressurizing the
ascent propulsion system. We are 175 hours 32 minutes contin-
uing to monitor. This is Apollo Control Houston.
ORION Jim, I have the tube lock. We are ready to
pressurize the APS now.
CAPCOM We're standing by. You have the GO for pre-
sure.
ORION Jim, after (garbled) we have two lights go
to tank 1.
ORION Ascent. Helium press supply tank 1. Pres-
surized right up.
ORION How does that look to you Houston?
CAPCOM Standby.
CAPCOM Tank 1 looks good. Go to tank 2.
ORION Roger.
PAO Apollo Control Houston.
ORION Okay, there is tank 2.
CAPCOM Roger.
PAO The crew of Orion proceeding with their
APS pressurization. The ascent engine will liftoff with 3500
pounds of thrust. It is not gimbaled like the descent engine,
rather it's mounted in a fixed position relative -- relative
to the lunar module body.
ORION Okay, we're cross reading with the new
procedure you just gave us Houston.
CAPCOM Roger.
ORION (garble)
PAO Flight Director Gene Kranz now taking a
status check with his team go to no go for ascent. Standing by.
CAPCOM Orion, you're go for liftoff.
ORION Roger.
PAO Apollo Control Houston 7 minutes 52 seconds
now from time of ignition. We show ground elapsed time of 175
hours 36 minutes.
PAO Apollo Control Houston, minus 5 minutes from
time of liftoff from the lunar surface. Relative silence in the
Mission Control as well as aboard ORION has -- we're proceeding
our -- in our countdown now. ORION has a go for liftoff.
PAO Apollo Control Houston, 3 minutes now from
time of ignition. Countdown proceeding as programmed. All systems
looking good at this time.
PAO Apollo Control Houston, Flight Director
Gene Kranz now pulsing his flight control team for a final status

APOLLO 16 MISSION COMMENTARY 4-23-72 GET 175:33 CST 19:15 MC-673/2

PAO check, we show 2 minutes now from time of
ignition.
ORION Okay, Houston master arm is coming on.
CAPCOM Roger.
ORION Two lights.
CAPCOM Roger.
PAO Mark 1 minute 30 seconds till ignition.

END OF TAPE

CAPCOM Coming up now on minus 1 minute, mark
minus 1 minute.

CAPCOM Minus 30 seconds. 20 seconds. 10 seconds
Houston, confirms good ignition start on Orion.

ORION Liftoff was on time.

CAPCOM Roger.

PAO Pitchover 53 degrees on time.

ORION What a ride. What a ride, what a ride.

PAO Thirty seconds, elevation rise rate
coming up as predicted, 1563 feet above the lunar surface.
Forty seconds, all systems locking good at this time. Coming
up now on 1 minute; velocity reading 366 feet per second.

CAPCOM Orion, you are go at one.

ORION Roger, locking good here.

PAO One minute 20 seconds 7 072 feet in
altitude, moving up. Mark one minute 40 seconds ascent
thrust looking stable, moving up. Coming up on 2 minutes
trajectory looks perfect reports Fido.

CAPCOM Orion, you are go at 2.

ORION That's good.

PAO Mark, 2 minutes 15 seconds 15 810 feet
in altitude range to go to insertion 154 nautical miles.
Two minutes 30 seconds the velocity now reading 1 299 feet
per second. Two minutes 50 seconds altitude now 22 460
feet above the lunar surface. Velocity now reading 15 096
feet per second.

CAPCOM Orion, you are go at 3.

ORION Roger, looking good.

ORION Got this thing tracking right together,
Houston.

CAPCOM Roger.

PAO That's Charlie Duke reporting both
guidance systems functioning right together. Three minutes
25 seconds, 29 000 feet in altitude. Three minutes 40
seconds 31 710 feet in altitude, range to go 131 nautical
miles.

CAPCOM Orion, you're go at 4.

PAO Velocity now reading at 2 450 feet
per second. Mark 4 minutes 30 seconds 41 385 feet in
altitude above the lunar surface. Range to go now 110
nautical miles.

PAO Four minutes 50 seconds. Velocity
now reading 3090 feet per second.

CAPCOM Orion, you go at 5.

PAO FIDO reports 2 minutes to go.

PAO Mark of 5 minutes 25 seconds. Velocity
now reading 3642 feet per second. Altitude now 51 039 feet
above the Lunar Surface. Range to go 78 nautical miles.

PAO One and a half minutes to go.
PAO Flight Director Gene Kranz now taking
the final status with his Control Center Team.
CAPCOM Orion, you go at 6.
PAO Mark 6 minutes 10 seconds, altitude
55 085 feet above the Lunar Surface, range to to 48 nautical
miles. Velocity now reading 4536 feet per second.
PAO Flight 0 reports 30 seconds.
PAO 6 minutes 50 seconds.
ORION Ascent terminated across feed, Houston.
CAPCOM Roger.
PAO 7 minutes 59 795 feet.
PAO We have shut down. Houston Copy
shut down.
ORION Okay.
ORION Insertion, Houston. On time minus
-310, -10, and plus 17.
CAPCOM Orion stand by for tweak.
CAPCOM Reminder to hit the stop button, down.
ORION Say again. Over.
CAPCOM You're okay.
ORION Say again Houston.
CAPCOM Never mind, you're standing by for
tweak.
CAPCOM I ahve the tweak for you.
ORION Okay. Go ahead.
CAPCOM 175, 54, 05 minus 2.0, minus 0 minus
1 0.0. Over.
ORION Copy at 175, 54, 05 minus 2.0 minus 0
minus 10.0.
CAPCOM Good readback.

END OF TAPE

PAO Apollo Control Houston, we copied the ground elapsed time for tweak burn at 175 hours 54 minutes 5 seconds. We now show an orbit of 42 nautical miles by 8.9 nautical miles. Standing by now for the results of the tweak burn. Ground monitoring reports the tweak burn is completed.

CASPER Tweak complete, Houston.

CAPCOM Roger, copy.

CAPCOM Orion, we'd like you to use the B system so open across feed and close the main SOV on system A.

ORION Roger. Okay, Jim, you got it we're cross feeding system Bravo.

CAPCOM Roger.

ORION Repeat 20 auto maneuver, picking up.

CAPCOM Roger.

CASPER Houston, Casper, we need a state vector when you are ready.

CASPER Houston, Casper.

CAPCOM Go ahead Casper.

CASPER Rog. I'll need a state vector. How soon do you expect to have one?

CAPCOM Stand by.

PAO This is Apollo Control Houston at 175 hours 57 minutes aboard Orion and the crew has programmed - computer programmed 20 punch tone and this the rendezvous navigation program.

ORION Okay, Casper, we have you visually.

CASPER I'm glad to hear that. I don't have you yet.

PAO Apollo Control Houston. That - John Young speaking to Ken Mattingly, both in orbit. Young reports Orion has command module visually.

ORION Come on, Ken.

ORION Your AGS in auto update, Jim?

CAPCOM Roger.

PAO This is Apollo Control, Houston. We show the two spacecrafts 126 nautical miles apart. Closure rate 452 feet per second.

ORION You have it?

CAPCOM Roger. It should be on it's way.

ORION Boy, Jim, the sunset is spectacular.

CAPCOM I bet it is.

CAPCOM Orion, there will be no T ephem update.

ORION And no T ephem update.

CAPCOM Casper, the computer's yours.

CASPER Thank you. And Orion, I've got about 2.2 volts on the signal radar. Can you give me a radar reading?

ORION Roger, we're at 113 miles. And I have you visually out the right side.

CASPER Okay, we need to try to reacquire, I'm several - reacquire on the eject.

APOLLO 16, MISSION COMMENTARY, 4-23-72, CST 19:35, GET 175:53 MC675/2

PAO This is Apollo Control Houston. A discussion
between the two spacecraft indicated a distance of 113 miles.
We show a closure rate now of 424 feet per second.

ORION Houston, what time is LOS?

CAPCOM Stand by.

CAPCOM We have a 176 23, Charlie.

ORION Okay, thank you.

CASPER I need another range check when you get
a chance to, please.

ORION Okay, we're at 106.5 miles.

CASPER Thank you.

END OF TAPE

PAO This is Apollo Control Houston at 176 hours 6 minutes ground elapsed time. We show the two spacecraft at a distance of 103 nautical miles apart and a closure rate of 402 feet per second.

CAPCOM Okay, do you have your tracking light on, sir?

DUKE Oaay.

MATTINGLY Tally ho.

ORION (garble)

CAPCOM Orion, this is Houston with TV isolation.

DUKE Okay. We're all here.

CAPCOM Okay. Double DX plus 77.6, double DY plus 3.8, Double DZ plus 3.1. A total of 77.7. TPF is 29. Over.

DUKE Right, copy. Plus 77.6, plus 3.8 plus 3.1, TPF 29.

CAPCOM Good read back.

PAO Apollo Control Houston. Apollo Control Houston. We now show the two spacecraft at a distance of 79 nautical miles apart and a closure rate of 330 feet per second.

CAPCOM We read it down here John, we can't read you very well, it's excessive noise (garble)

YOUNG Okay.

CAPCOM Okay, we copy to John.

END OF TAPE

PAO Apollo Control Houston, about 10 minutes away, now, from Loss of Signal with Casper. We show a range between the two spacecraft of 74 nautical miles. Closure rate 313 feet per second.

DUKE Okay, Ken, we did a Recycle. You're listed 78.0 plus 2.7.

CASPER Okay, we copy.

PAO Apollo Control Houston. 176 hours 17 minutes ground elapsed time. We show a range of 65 nautical miles between the two spacecraft and a closure rate of 277 feet per second.

ORION Hey, Houston, Orion. How do we look for an APS TPI?

CAPCOM Orion, you're Go for an APS TPI.

ORION Alright. What's your estimate of the burn time?

CAPCOM Orion, are you requesting burn time? Over.

ORION Affirmative.

CAPCOM Roger. Stand by.

CAPCOM Okay, Orion. Burn time for TPI should be about 2.5 seconds.

ORION Rog. Thank you. 2.5.

PAO Apollo Control Houston. 176 hours 20 minutes -

ORION - 17 minutes. You want to just keep marking and close to VERB 93 then. Right?

CAPCOM Standby by.

ORION The answer to that, Jim, is yes, I'm sure. Just wanted to make sure somebody had looked about it.

CAPCOM Okay, just continue marking, John.

ORION Right, man.

CAPCOM Okay, you're coming up on 2 minutes to LOS and you're looking good.

ORION We sure are, man.

CAPCOM - And all systems have converged.

PAO Apollo Control Houston. We show a range, now, of 52 nautical miles, a closure rate of 215 feet per second. Less than two minutes, now, from Loss of Signal, as Orion and Casper pass behind the Moon.

CAPCOM Orion, you could do your final comp at 10 instead of 8 - your preference.

ORION Okay.

PAO Apollo Control Houston. We've had Loss of Signal with -

CASPER Victor Hotel. How do you read?

ORION Read you loud and clear, Ken.

CASPER Hey, this stuff is working pretty good
today, isn't it?

ORION It really is, Ken.

CASPER Man, that - I can see that thing -
light of yours at 70 miles on the telescope, even.

ORION I can see you (garble)

PAO This is Apollo Control Houston. We've
had Loss of Signal, now, with both spacecraft - Orion now
in hot pursuit of Casper as they both pass behind the
Moon. We heard at least half of the conversation as the
two spacecraft were talking before we had LOS with Casper.
We're at 176 hours 24 minutes ground elapsed time, and
this is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control Houston at 177 hours 9 minutes ground elapsed time. We're less than a minute away now from predicted time of acquisition of CASPER and ORION. We'll standby and monitor the conversations as they develop on this front side pass.

PAO Apollo Control Houston. ORION is acquired.

ORION Houston ORION. Over.

CAPCOM ORION this is Houston. Go ahead.

ORION Okay Jim, we're 3 miles out and closing. We did a TPI of plus 78.0 plus 2.7 plus .7 and we burned 2 midcourses of minus .3 minus .1 plus .9 plus .5 plus .2 plus .7 and we got a visual.

CAPCOM Roger, I copied all that.

ORION Guess we don't need to tell you that this is a sweet machine.

CAPCOM You're so right.

PAO That's Charlie Duke aboard ORION talking to our CAPCOM Jim Irwin.

PAO Apollo Control

ORION A little tiny black dot to the unaided eye.

PAO Apollo Control. We show a range now of 2 and a half nautical miles. Range rate of 32 feet per second.

PAO Apollo Control Houston. 177 hours 16 minutes ground elapsed time. We show a range now of 1.3 nautical miles, range rate 28 feet per second.

ORION I thought the idea was we take turns. Okay.

PAO Distance of 6/10ths of a miles away now, range rate 27 feet per second.

END OF TAPE

PAO at rate 27 feet per second. Ground elapsed time now 177 hours 19 minutes. The two spacecraft now a half a mile apart.

DUKE Okay.

YOUNG Okay. Man that was good.

PAO Orion and Casper a quarter mile apart now. Range rate 15 feet per second. We're at 177 hours 20 minutes ground elapsed time. Range rate now 10 feet per second.

DUKE You look a lot smaller in the day time.

YOUNG Same range.

DUKE Now, your four firing thrusters look like little flash lights when they fire. Okay, well wait till you get back around there and take a look. We know they aren't out very far (garble)

YOUNG Beautiful.

DUKE This looks more like an animated curtain.

DUKE Hey, I'm ready to go to attitude whenever you are.

CAPCOM This is Houston, Orion, when you're station keeping let me know we have some words for you.

DUKE Okay, we're fixing to keep them.

CAPCOM Okay. John, looking at the pictures of the liftoff, it appeared something might have come loose. Skin on the back of the vehicle and or that region, we want Ken to take some pictures of the LM's so we have a slight modification to the - the flight plan, we'll be asking you to do a yaw 360 after Ken does his VERB 49 maneuver to the docking attitude.

YOUNG I got it (garble)

DUKE Okay. Right here I've got good lighting (garble)

CAPCOM There's a lot of noise so we can't hear you very well but - -

DUKE (garble) something here. Stand by I'm going to get the camera ready (garble)

CAPCOM 16, this is Houston. Let me just relay here the procedure. We want you to do the - - Ken do the VERB 49 maneuver to the SIM bay attitude per flight plan and then do the 360 degree roll and of course following that you do the VERB 49 maneuver to the docking attitude. Then I have a change for the flight plan when you're ready to copy.

MATTINGLY Okay. We're in perfect position to make pictures of the LM right now. All we have to do is the pitch. I think first we go to the other sequence, is that correct?

CAPCOM Okay. If you're in a position to take pictures of the LM we wanted the LM to do a 360 degree yaw and you're to take pictures of the -Z portion of the ascent stage using the same camera setting that you have on the dak

CAPCOM and the EL. Set the focus on the EL should be changed to infinity. Over.

MATTINGLY Okay. (garble) We have pictures (garble)

-Z (garble)

CAPCOM Okay. Ken, it's the back side of the LM.

MATTINGLY Rog. And I'll turn the DAC on and I'll a - - fix the EL.

CAPCOM Okay. And Ken if you observe anything there would you please relay your observations.

MATTINGLY Yes sir, certainly will.

YOUNG Okay, Houston. On liftoff one of the matrix blankets blew out in front of the LM and hit the ground about 200 meters in front of the LM. Over.

CAPCOM I understand a portion of the MESA blankets still on the front.

YOUNG Yeah, that might have been what we saw, it seemed pretty high in the air. And it went straight out to the West.

CAPCOM Okay. We copy.

MATTINGLY Okay, everything in the +Y side looks clean just the surface (garble) for (garble)

MATTINGLY Okay, on the back side - -

CAPCOM Orion will you go forward OMNI.

MATTINGLY Looks like some of the thermal blanket around the ECA's on the back end there is pretty badly chewed up.

CAPCOM Okay. We copy.

MATTINGLY The stuff is torn - - a couple of panels are torn off and some of the stripping between it is - - it looks like it was struck by (garble) but it looks like all the mylar blankets underneath are still intact.

CAPCOM Roger.

END OF TAPE

ORION (garble) we're still intact.
CAPCOM Roger.
ORION Okay, we got some more stuff on the other side.
CAPCOM Ken can you observe whether it's possible for sunlight to directly impinge on portions of the spacecraft?
CASPER No sir, it's not possible from the back, I can't tell about the button but on the back side, the mylar blankets are still intact -- it's only that outer covering that's broken.
CAPCOM Okay, we copy.
ORION I -- I tell you this things really flys beautifully.
CAPCOM ORION aft OMNI.
ORION Sure wish airplane flying was this easy.
ORION You better believe it.
CAPCOM Okay, so can we assume your pressing on with the flight plan?
CASPER Okay, I'm ready to go to my attitude.
ORION Rog, we're pressing.
CAPPER Okay, John, are you ready for me to go to my attitude?
ORION Roger. Wait a second till we get (garble)
CASPER Okay, I'm just going to do a little roll and --
CAPCOM ORION, we go normal and voice.
ORION Okay, my bids down. Okay, it will be a half degree a second. Are you all set? Okay, you have station-keeping and I'm maneuvering.
CAPCOM CASPER we need rate 2 in the B-mags.
CASPER You've got it.
CAPCOM Roger you're fast.
YOUNG Hey Charlie, have you got a forward VHF there?
CAPCOM Okay, the things I'd like for you to look at are -- you remember on the aft shelf of the SIM Bay, there's 2 boobs back there. The one on my -- the most plus Y one is the mass spec -- its got a white cover and its kind of a rectangular shape cover. The one on the left or its really in about the center of the SIM bay -- the aft end and it has a silver cover and that's the gamma ray. Would you take a look and see if either of those covers are not quite closed because we have indications in the spacecraft that they're not closed and indications on the ground that they are.
ORION Are you maneuvering Ken
CASPER Yes sir This is one of the fastest maneuvers I've made in a long time. Well I'm not there yet Charlie. I'll tell you when I get there. Got about 20 degrees of pitch and 9 degrees of roll. Now then I'll wait for you to take a look.

CASPER And then after you do that why I will do a 360 degree rotation about my X-axis while you take pictures of the (garble).

CAPCOM OMNI delta CASPER.

CASPER Houston did you call CASPER?

CAPCOM Yes, OMNI delta.

CASPER Okay, thank you.

ORION Can you tell me which side of the SIM Bay? Okay and its (garble) cover. Okay and it's partially open. Okay, can you -- you don't see anything white sticking out from under it. Okay because the (garble) shield on the mass spec is a black. Okay, do you see the gamma ray door? Yeah. Okay, no no I'll tell you --

CAPCOM ORION you have 32 minutes till darkness.

ORION Okay. On the quad above the SIM Bay, you mean the A quad.

CAPCOM Yep.

CASPER Okay good, can you get some pictures of those 2? Okay, and I'm ready to start my 360 roll when you get some pictures of those things. Okay, I'm going to roll left.

PAO Apollo Control Houston 177 hours 37 minutes ground elapsed time. Ken Mattingly aboard CASPER doing a 360 degree roll per the flight plan. ORION AND CASPER now station keeping.

CASPER You guys are pretty bad, there's even debris outside up here. It was nice and clean before you came back.

END OF TAPE

ORION Okay.
ORION Okay, I'm getting ready to spin over to the new attitude. Very close to the attitude we came up in. All set.
ORION Beg your pardon, John.
CASPER Yes sir going to docking attitude. It's almost identical to our rendezvous attitude.
CASPER (garble) per go OMNI Alpha.
CASPER All ready got 90 degree roll to go.
CASPER Well, I've got about 10 degrees in pitch.
CASPER Houston. (garble) (unaudible)
ORION Houston. Casper wants a logic go and OMNI.
CAPCOM Roger. You're at go.
ORION Yeah, they gave you go Ken.
CAPCOM Casper OMNI Alpha.
CAPCOM Casper, let's hold up on the power on.
CASPER Yes sir. I thought you just gave me a go, but I guess not.
CAPCOM Okay, Casper, let's take the logics off and we'll go through it again.
CASPER Okay. Logic's OFF.
CAPCOM Stand by.
CAPCOM Okay, Ken. You've go for power ON. I'm sorry logic on.
CASPER Okay. The Logics are coming on. There's number 1, and there's number 2.
CAPCOM Okay, Casper. You go for power ON.
CASPER Okay. Power on is coming on.
CASPER 1, there's 2.
CAPCOM Roger.
CAPCOM Looks good here.
ORION Okay, Ken. Are you there?
CASPER I'm about 5 degrees from it. You can go ahead and start your maneuver, I'll take stationkeeping.
ORION Okay. You have it.
PAO Orion, pitching down 90 degrees.
PAO We're at 177 hours 46 minutes ground elapsed time standing by as ORION and CASPER go through their final paces, before docking.
ORION Okay. I'm approaching. Your attitude looks good.
ORION I'll tell you when we hit capture.

END OF TAPE

ORION Say again.
ORION (Laugh)
ORION Okay, about 5 feet.
ORION Doesn't look like it. I don't have any barberpoles. There we go. Took a couple of extra blurps to get you. Okay, are you free?
ORION Okay.
ORION Okay, it looks pretty fair. How about if I just retract you?
SC (Garble)
ORION I believe we're there.
ORION Casper's captured Orion!
CAPCOM Very good. We were wondering what took him so long.
ORION Yeah, he's all locked on. We were doing these fancy maneuvers up yere. Hardly anybody ever gets to do a 360 yaw on the Moon.
CAPCOM Orion, this is Houston. We're about 28 minutes to LOS, and I have about 5 pages of timeline changes, whenever you're ready to copy.
PAO This is Apollo Control Houston. We read docking at 177 hours 53 minutes ground elapsed time.
CAPCOM Close the Cross Feed and open A Main SOV.
CAPCOM Casper, let's hold off on the P20; we need good comm to get all these changes up.
CASPER Okay. Is this attitude good?
CAPCOM It's very good.
CASPER Okay, Jim, go ahead.
CAPCOM Okay. Timeline Book Changes. Start on Page 13 and change 17355 to 17754. And under Configure S-Band, Item 1, change CSM Maneuver to Jettison Attitude to CSM Maneuver to SIM Bay minus X Forward Attitude and delete Proceed with Prep, etc. Over.
ORION Rog. We copy. Go ahead.
CAPCOM Okay, Item 2, delete; Item 3, change prime to secondary; first line, change Right to Off and High to Low. Add a second line, S-Band Antenna Aft, and delete remainder of Step 3. Add the following: Exterior Light Off, Perform Docked De-activation (staged) Steps 1-7 of the Contingency Checklist, Page 3-9. Over.
ORION Okay. Delete all of Step 2. That's the verified Jet Attitude. Step 3, S-Band to secondary Off and Low. Delete - mixed all the steerable stuff, and add External Light - Exterior Light Off, which it is, and Docked De-activation (staged) Steps 107 in the Contingency Book.
CAPCOM Okay. Next is change 174 hours to 17759, under Prep for Transfer and Step 3, change Line 4 to read

"LMP Purge Valve 1, aft, LHSSC).

ORION Okay. That's - All I did was add in LMP Purge Valve. All the rest was there.

CAPCOM Okay, I have a question here, Charlie, but then on the next line it's - under neck ring, he said add Stow Commander's Purge Valve - oh that's serial number 194 in ISA bottom pocket.

CAPCOM Okay, your purge valve apparently is serial number 197. John's is 194. Does that make sense to you?

ORION Yeah, I got it. I know which one.

CAPCOM Okay, if you've got that, I'm doing a Step 5 - it's delete first 2 lines. Over.

ORION Hey, we'd been using the purge valves interchangeably. I don't know who was using whose when we were out on the Moon.

CAPCOM Okay, we'll talk about that later. Let me get the rest of the change to you. Under Step 9, after SE Audio Open, add ECS LCG Pump Open; delete remainder of step. Insert the following: Cabin gas -

END OF TAPE

CAPCOM Audio open, add ECS LCG pump open. Delete remainder of step. Insert the following, Cabin gas return open, suit circuit relief to auto, and that's a verify. Suit ISO valve, both to suit disconnect. Both disconnect hoses and stow. Both doff suits, install PGA electrical connector covers from the purse, and stow all LGC plugs in suits, in the purse. Install neck rein dust covers in the purse, transfer suit to CMP then configure circuit breakers per 3-10 and 11 of contingency checklist. Over.

SC Okay, copy. Cabin gas return, add up to SC audio open, LGC open, correction LGC pump open, cabin gas to open, suit circuit release auto, suit disconnect, suit to hose disconnect, doff suits, put on electrical connectors, the LGC plugs, dust covers and then go to 3-10 for the CB's on contingency checklist.

CAPCOM Okay, then on page 14, step 11, delete PPK's, 3 on the left hand mid section and the aft SRC's. That's in parentheses. The next item is the flag kit, next item is flight data file. Then add timeline book and LM contingency checklist. Over.

SC Okay, scratch PPK's, the flag kit, the flight data file and add timeline book and the LM contingency checklist.

CAPCOM Okay, step 14 delete. And delete MSFN uplink, update, target pings and configure X step 1. Over.

SC Okay, MSFN uplink update delete step 1.

CAPCOM Okay, then on page - we'll delete page 15, 16 and 17 and then on page 18 under IVT to CSM delete step 2 and prior to LM to CM transfer list add perform final deactivation for contingency checklist, page 3-

SC Hey, hold on a minute - hold on a minute - hold on, Jim.

CAPCOM Okay.

SC You're going faster than he can move. I can't turn the pages that fast. I'm on - I've deleted page 16 and 17 and I'm on page 18. Go ahead.

CAPCOM Okay, under IVT to CSM delete step 2 and prior to LM to CM transfer list add perform final deactivation for contingency checklist, page 3-12 to 3-15. Over.

SC Okay, on IVT to CSM delete step 2, perform final deactivation for 3-12 to 15 and contingency checklist.

CAPCOM Okay, and then under the transfer list delete DSEA,DPK's, flag kit, flight data file and the jettison bag, purse and contents, unused food, used urine bag, and used fecal bags. Over.

SC Okay, we copy that.

CAPCOM Okay, and then go back to page 14, Charlie, let me know when you're there. I think we've missed something there.

SC Okay. Go ahead.

CAPCOM Okay, on the right hand side of that page we want to delete essentially 3 blocks there, the MSFN uplink update, all the steps under that, the 5 steps, then the next target PGNCS, and then configure AGS. All that portion is to be deleted.

SC Yeah, I got you. Go ahead.

CAPCOM Okay, under configure AGS, all those AGS - the 4 AGS entries are deleted. You pick up there with step 2.

SC I got you.

CAPCOM Okay, then the - the following are changes in the LM contingency checklist on page 3-9. Step 4, add verify - do you want me to wait until you get to the contingency checklist, Charlie?

SC Yeah, you better wait until he floats over there to it.

CAPCOM Okay, let me know, we've got 17 minutes to LOS. Shouldn't take us long to make -

SC Okay.

CAPCOM contingency checklist changes.

SC What page did you say?

CAPCOM Starting at page 3-9.

SC Okay, go ahead.

CAPCOM Okay, on page 3-9, step 4, add verify after master arm off. Then delete audio commander and step 6, add verify after mode control both off. Then step 7, delete first 2 lines. And then on - why don't you repeat up to that point. Over.

SC I got it all, Jim. Step 4 verify master arm off, delete audio commander, mode control both off, verify window shades and command and transfer delete. We'll just leave him over here, huh? Hey Jim, I - I guess I think that the verify the master arm off is kind of a silly change to make Charlie copy if you got 25 pages of that.

CAPCOM Now listen. John, we've just have about 1 more page, and we'll be finished.

SC Okay.

CAPCOM Okay, on page 3-10, secondary power amp close. And then on page 3-11, let me know when you're there.

SC You speak.

CAPCOM Okay, row 3, SE audio open and primary amp open. Row 4 S-band antenna open. And then we'll go to page 3-12, let me know when you're there.

APOLLO 16, MISSION COMMENTARY, 4-23-72, CST 21:42, GET 178:00 MC 683/3

SC I'm there.
CAPCOM Okay, step 2, change audio LMP to audio both. Change line 2 to read VHFB and VHFA transmitter and receiver off. Then step 4, add after secondary S-band transmitter and receiver open, secondary power amp open and delete primary power amp, open. Then step 5, delete 3 lines and add

END OF TAPE

CAPCOM their secondary S-band transmitter and receiver open. Secondary power amp open and delete primary power amp open then step 5, delete 3 lines and add connect LM CM umbilicals. Over.

SC Okay, what was that last one?

CAPCOM The last one was step 5 to delete 3 lines and add connect LM CM umbilicals. Over.

SC Okay, copy. (garble)

CAPCOM Okay, then on step 6, under to use CSM power, add LM power dash 1 and Lm power dash 2, main B circuit breakers close and CSM. in parenthesis. Over.

SC Okay, we copy.

CAPCOM Okay then page 3-13 looks like we just have about 3 or 4 more changes here.

SC Go ahead.

CAPCOM Okay, on 313 under row 3, open utility light. On row 5 open translunar bus tie and then the next change is on page 3-14. Over.

SC Go ahead.

CAPCOM On 314, row 2, open ASA, row 4 open S-band antenna and translunar bus tie. Over.

SC Roger. Go ahead.

CAPCOM Okay the next -- and the last is on page 3-15 Charlie. Let me know when you're there.

SC Turn the page and I'm there.

CAPCOM Okay, step 9. Add after SN water close, cabin gas return to egress and last change is step 9, delete the first line. Over.

SC I got you.

CAPCOM That's it.

SC Okay, what's the plan Jim, just to power this move down and then come back in tomorrow and fire it up again for jettison?

CAPCOM That's affirmative Charlie and will you get the AGS mode control off.

SC It's off.

CAPCOM And ORION, if you'd like I'll go through the basic plan here, post docking so it's clear in your minds. The first step of course is to doff suits in the LM and of course we're going to postpone some of the LM transfer until after you wake up. We're powering down the LM and we are going to -- we're drying out the water boiler. And we'll be ready to close out the LM at 179:20. That's AOS plus 10 minutes on this next pass. And then step 5 is -- we'll -- y'all will get in the LM tomorrow and complete the transfer and LM jettison and you will need the LM timeline book and the LM contingency checklist at docking to accomplish the deactivation. Over.

SC I got you.

SC I'll be with you in just a minute. Okay, I got the drogue out -- I mean the probe and the hatch out and I'm ready for the drogue so if you're going to do anything that affects the pressurization, let me know.

SC Yeah, I read you. Houston ORION over.

CAPCOM Go ahead ORION.

ORION Okay that first part, dock deactivation stage, was that just step 1 through 7 or the whole thing?

CAPCOM No, steps 1 through 7.

ORION Okay. Hey you'll have to open the door and find out. Okay Houston mark, primary about flow is close.

CAPCOM Okay, we copy and CASPER you can go into your P20 attitude, minus x forward.

ORION John verifies that the master arm is off.

CAPCOM Alright. And CASPER this is Houston.

CASPER Go ahead.

CAPCOM Roger Ken, we're finished with that update, so you can press on with the minus x forward.

CASPER Okay.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 2202 GET 178:20 MC-685/1

CAPCOM Okay. 16, we're about 30 seconds from LOS
and AOS 1 - -

YOUNG Okay, (garble) will be D20.

CAPCOM Okay. And AOS 17908 and you're angles are
0 and 170.

YOUNG Okay. Thank you Jim.

PAO This is Apollo Control Houston at 178 hours
23 minutes ground elapsed time. We've just had loss of signal
with Casper as the spacecraft passes behind the Moon on it's
53rd revolution. We'll take the line down at this time and
bring it back up at that time when we reacquire. This is
Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control, Houston, at 179 hours 7 minutes ground elapsed time. We're less than a minute away now from predicted time of acquisition with Casper. We'll stand by and monitor for conversations with the crew of Apollo 16.

PAO Apollo Control, Houston. We're now receiving spacecraft data.

CAPCOM 16, this is Houston. How do you read?

CASPER (garble)

CAPCOM Roger. There's still excessive noise, just barely hear you.

CASPER Well, we're here.

CAPCOM Okay.

CAPCOM Orion, we'd like for you to switch OMNI antennas.

CAPCOM Ken, do you know whether John and Charlie still have their comm carriers on. Are they monitoring comm with us?

CASPER No Jim, they're not. And, Charlie just said that he's got a command B bus off scale low, but the battery looks okay.

CAPCOM Okay. Ken, will you have them close circuit breaker on panel 11, signal conditioner 1, on row 3?

CASPER Okay.

CASPER Jim is there something in particular that you want? I'll see if I can get them for you.

CAPCOM No. We're just interested in getting data from the LM to - so we can go ahead with the close up.

CASPER Okay.

PAO This is Apollo Control in Houston, 179 hours 16 minutes ground elapsed time. We presently show Apollo 16 with an apolune of 65.5 nautical miles perilune of 54.3 nautical miles on the 54th revolution around the moon.

END OF TAPE

ORION Houston, Orion how do you read.
CAPCOM Orion, this is Houston. We read you loud and clear.
ORION Okay, somebody wanted me up for comm for some data or something Jim.
CAPCOM Roger. We just - - we just wanted to look at the LM status.
ORION Okay, Jim I guess he's not copying you.
CAPCOM And Orion, we were wondering you know whether you begun the post docking checklist.
ORION Okay. Yes, sir. We're down, we transferring gear. We've completed the deactivation - - docked the deactivation stage rather. Over.
CAPCOM Can you confirm these PCM bit rate low.
ORION It's low now.
CAPCOM And Charley you did call primary evap flow #1 closed I believe. Confirm.
ORION That's right Jim. It was closed. I gave you a mark on that.
CAPCOM Roger. I copied.
CAPCOM Orion, this is Houston. Verify that you have ascent water selected and verify prime of evap flow #2 closed. And verify descent water closed. Descent water selected.
ORION Okay, it's all closed. Jim, that primary evap flow 1 and 2 vent closed, I got the wrong valve, I'm sorry.
CAPCOM Okay. We copy.
CAPCOM Casper, this is Houston. Verify that you're in SIM bay attitude. Are you in the proper RCS configuration for SIM bay operation.
CASPER Well I might not be, I'll see. Okay, it is now. It was not.
CAPCOM Okay.
CAPCOM And Orion, this is Houston. Could you tell us where you are in the timeline book.
ORION Yeah, I'm putting the feed from the (garble) bag in - - Ken's stowage thing here.
CAPCOM Okay. You didn't get down to step 9 in the post docking timeline yet, did you?
ORION John's got his suit off. I've still got mine on. And the - - everything else has been done.
CAPCOM Okay. I'm looking under step 9 I gave you some changes there which included configuring circuit breakers for the Contingency checklist.
ORION No, I haven't done that. I was going to wait till I got my suit off. You want me to do that now?
CAPCOM No, just stand by.

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 2300 GET 179:18 MC-687/2

ORION	This means 310.
CAPCOM	Okay. We know where you are now Charley.
ORION	Okay. Can I press on.
CAPCOM	Yes, go ahead Charley.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 21:32 GET 177:50 MC-688/1

CAPCOM Casper, this is Houston.

CASPER Yes, sir.

CAPCOM Roger. We'd like to vverify Mass Spec Experiment Switch On and IN Source to Standby. We're not receiving any data down here.

CASPER I thought that the Experiment was On, but it looks like it's Off. I don't know whether we didn't turn it on or it got knocked off. But it's On now and Source is in Standby.

CAPCOM Orion, this is Houston.

ORION Go ahead.

CAPCOM Roger. It's going to take some load to dry out that water boiler, so don't do Step 9 yet. We're thinking of bringing some more equipment back on to reduce that dry-out time. Over.

ORION Roger.

CAPCOM Casper, will you go Auto on High Gain?

S/C Who did you call, Jim?

END OF TAPE

CAPCOM ORION, this is Houston.
ORION Go ahead Jim.
CAPCOM Roger. A few things that we want you to activate here to put a load on that water boiler. Have 5 items, if you're ready to copy.
ORION Why don't you just read them to me and I'll turn them on.
CAPCOM Good idea. Suit diverter valve to cabin.
ORION Go ahead.
CAPCOM Suit fan number 1, circuit breaker on panel 11 close. While you're at panel --
ORION Go ahead.
CAPCOM get inverter 1 close on panel 11.
ORION Go ahead.
CAPCOM And on panel 16, inverter number 2 close and (garble) close. Over.
ORION Rog. Right got them. Is that all?
CAPCOM Yeah, that's all for now.
PAO This is Apollo Control Houston 179 hours 42 minutes ground elapsed time. That was Jim Irwin reading up procedures to lunar module pilot Charles Duke for speeding the drying process of a water boiler aboard ORION. The 2 spacecraft now docked and in the 54th revolution around the Moon.
CAPCOM ORION this is Houston. If it's convenient Charlie will you put the biomed in the right position?
ORION How's that?
CAPCOM Standby.
ORION Sure looks like a dust storm in this cockpit right now.

END OF TAPE

SC Hey, Jim, all the gear has been transferred into a start and we're gonna - I'm getting out of my suit now. We'll be off comm for about 10 minutes.

CAPCOM Okay, very good.

CAPCOM Casper, this is Houston.

CASPER Go ahead Jim.

CAPCOM Yeah, Ken, we'd like you to advise John and Charlie that we'd like them to be on biomed tonight. Tell them we'd just like to make sure that - get a comparison of their good performance on the surface and see if it's the same in orbit. Over.

CASPER Roger.

END OF TAPE

CAPCOM Casper, this is Houston.
CASPER Go ahead Houston.
CAPCOM Okay, Ken. Is Charlie going to get
back on again shortly in the LM. If not, I have a short
procedure here for you to give to him.
CASPER I think (garble) back on.
CAPCOM We want Mass Spec ION source on Casper.
CASPER Okay.
CAPCOM Yeah. Charlie we want you to -
ORION Keep going.
CAPCOM Open those four circuit breakers
which you have closed. And, I'll repeat them for you.
That 2 fan #1 on panel 11, inverter 1 on panel 11 and on
panel 16 inverter 2 (garble). Those four circuit breakers
open.
ORION Okay, Jim, they're all open.
CAPCOM Thank you.
ORION And looks like the boilers drying out
the glycol stopped up to 55. We got a glycol light.
CAPCOM We'll advise you on that in a few
moments.
PAO Apollo Control, Houston 180 hours
9 minutes ground elapsed time, Flight Director Gene
Krantz now polling this flight control team for go for
Lunar Module close out.
CAPCOM Orion, Houston.
ORION Go ahead.
CAPCOM Roger Charlie. You have a go for close
out. However, dry out will not be complete until 180:30,
at which time you can continue with your deactivation.
ORION Okay, Jim. What you mean a go for
close out then - You want me to wait until the water boiler
drys up before I do anything else.
CAPCOM Before you pull anymore power OFF.
In other words thru your circuit breakers. Want you to
wait on that until 180:30 which is about 18 minutes from
now.
ORION Rog., we opy. Only thing we got
left over here is the suits and we'll get them over now.
CAPCOM And at that time, Charlie, you should
be on page 3-12 of the contingency checklist.
ORION Rog.
ORION Hey, Jim, give me that time again for
water boiler dry out I am sorry for taking off the comm and
stuff.
CAPCOM Roger, Charlie. That was 180:30.
ORION Okay. 180:30 ah - What time is it
now we don't have a clock.
CAPCOM 180:16.
ORION Okay. - -

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 23:59 GET 180:16 MC-692/1

ORION Okay. 180:30. What time is it now, we don't have a clock.

CAPCOM 180:16.

ORION Okay. We're going off comm then and I won't pull any more breakers till 30. Over.

CAPCOM Okay. That sounds good.

CAPCOM Okay, we're going LOS in about 10 seconds.

PAO This is Apollo Control 180 hours 21 minutes ground elapsed time. We've had loss of signal as Apollo 16 went around the corner on revolution 54. The gold team of flight controllers taking over here in the control room. As the white team headed up by Gene Kranz prepares to leave, get some sleep because they have a quick turnaround and relieve the gold team in turnaround 8 o'clock later this morning. There will not be a change of shift press briefing with the white team. 54 minutes till next acquisition of signal. Flight plan showing rest period to begin around 181:30 about an hour and 10 - - 12 minutes, an hour and 8 minutes from now. At 180:22 this is Apollo Control.

END OF TAPE

PAO This is Apollo Control 181 hours 6 minutes into the mission of Apollo 16. Less than a minute away from acquisition of the combined Apollo 16 spacecraft, Orion and Casper, docked after successful stay on the Moon, coming up on lunar orbit number 55. Flight planners here in the control center are devising a revised flight plan for the period up to transearth injection at which time we should be back on the premission flight time. This will take forcing of the ground elapsed time, what they call a GET update of some 22 hours. The revised flight plan should be completed by around 8:00 AM this morning. Standing by for first call to Apollo 16. The Apollo 16 crew will be put to bed fairly early through this front side pass. They've had a rather busy day today and will have an equally busy one tomorrow with subsatellite jettison, lunar module jettison, and transearth injection, coming up in fairly rapid succession. No word yet from the crew of Apollo 16. Spacecraft communicator, Tony England, standing by for their call, checking with flight director on some maneuver pads, timelines to be read up to the crew. The communications engineer reporting to flight that we may be slightly late in getting signal locked up because of the antenna position on the spacecraft. Let's just stand by on airground until the first call is made.

END OF TAPE

CAPCOM Okay, Apollo 16, Houston.
CASPER Houston, Casper.
CAPCOM Ah, hello there, Ken. We'd like you to
go to ACCEPT and we'll send up a revision to your state vector,
and we'll send up your jet monitor and activator.
CASPER Houston, Casper.
CAPCOM Casper, this is Houston. Do you copy?
CASPER Yeah, that's the first we'd heard from
you.
CAPCOM Okay.
SC Did he do it, yet?
CAPCOM Okay. Ken, we're having a little trouble
with our comm link, here. We'll get back to you in a minute.
CASPER Okay.
CAPCOM And we have a TEI 60 PAD here whenever
you want to take it.
CASPER Okay, Tony, we're ready for your TEI 60
PAD.
CAPCOM Okay. TEI 60 SPS G&N. 38581 plus 067
plus 0981923458.71 plus 30350 plus 05821 minus 01278 rolls
181088013. The rest is NA, comments. GDC align, serious
and (garble). Roll align 131; pitch 029; yaw 016. Ullage
2 Jet 17 seconds. And the longitude at TIG is minus 171.96.
That's it.
CASPER Okay, Tony. TEI is 60 PAD, SPS G&N
38581 plus 067 plus 098192 3458.71 plus 30350 plus 05821
minus 0127.8, 181088013. Serious and (garble) set stars, roll
align 131; pitch 029; yaw 016. 2 and Jet 17 seconds. Longitude
in TIG minus 171.96.
CAPCOM Okay. Good readback. Now we'd like you
to go ACCEPT and we'll update your state vector and send up
the jet monitor. And we'll go ahead and activate it.
CASPER Okay.. And I understand you'll update the
state vector and activate this jet monitor when you get it
set up.
CAPCOM Roger.
CASPER Are you going to spend all day there,
Tony?
CAPCOM Oh, my wife's gotten so tired of my being
around the house, she just sent me out. I might as well stay
here. Gee, I was in two hours today.
CASPER Get serious.
CASPER I'll be darned.
CAPCOM Jerry, here, says he hasn't had a chance
to congratulate you on an outstanding job up there, so this
whole Team's sending up a well-done.

APOLLO 16 MISSION COMMENTARY 4/24/72 CST 00:53 GET 181:10 MC-694/2

CASPER Hey, man, we really appreciate some stuff they've been doing for us. I'll tell you. We're going to have to get a thing going at the place down there when we get back.

CAPCOM Rog. Everybody agreed with that in a hurry.

CAPCOM He calls it a happening.

CAPCOM Okay, and John, could you go ACCEPT please?

CASPER Not (garble)

END OF TAPE

ORION Houston 16.
 CAPCOM Go Charlie.
 ORION Hey Tony, how about a few words on what the general plan is for tomorrow.
 CAPCOM Okay, standby one and I'll get them ready.
 ORION We're not --
 CAPCOM Okay Apollo 16 for tomorrow we've give you a flight plan update in the morning but just -- a resumee here. We'll have you wake up at 189:30. That'll give you a good nights sleep there. And we'll transfer back over the LM and get the rest of the gear back over and activate the LM, come back to the command module and don the suits and jettison the LM and jettison the satellite and towards the end of the day, we'll do a TEI. We've got a plan for using the mapping camera and altimeter most of the -- I think it's most of the day and we have some pan camera passes also. We'll get the details on that up tomorrow.
 ORION Okay, we're not going home with any blank film are we Tony?
 CAPCOM Okay Ken all the pan will be used up but it looks like we'll have several hundred feet of the mapping camera.
 ORION Okay. Well one thing about it Tony with 1 suit on and 1 suit off a day it -- you don't have to worry about your excercise periods.
 CAPCOM You mean you're not going to wear out the ropes tomorrow. Huh?
 ORION Doing the suit donn and then doffing is equivalent of wearing out a set of ropes.
 CAPCOM Ah, I believe it. You guys will be all set for a Houdini act.
 ORION Hey Tony, did -- Tony did you say we get up at 8 -- 189:30?
 CAPCOM That's affirmative. It's 181:27.
 ORION That's amazing. That's what I was just looking at.
 CAPCOM What don't you think you can sleep that long. Golly I'd think you'd sleep 12 hours. And y'all have an estimate on when you'd be ready to go to bed?
 ORION Probably -- I -- we just started eating.
 CAPCOM Okay. And you can go back to block and your EMP is running. And our plan here is once you get to bed, we'll do all we can to not disturb you until it's necessary to meet the schedule for tomorrow.
 ORION Which is 189:30 right?
 CAPCOM We may have to stop --
 ORION If we stay up all night, tomorrow morning we're going to be awake at 189:30.
 CAPCOM Okay.

CAPCOM There's some slop in that John, we may be
able to even slide that some.

ORION I just as soon get up a couple of hours
earlier and use the mapping camera film.

CAPCOM Hey you're really socking it to us here.

ORION Good.

CAPCOM Why don't you give us an estimate on how
much time you're going to need in the LM tomorrow before you
get to the LM activation.

ORION Around 30 minutes would probably do it
Tony.

CAPCOM Okay.

END OF TAPE

CASPER (Garble)
CAPCOM Incidentally, John, you got three dots
from the Cape.
CASPER Now you're talking.
CASPER (Garble) (Laugh)
CAPCOM Apollo 16, somebody may be on VOX,
there. Every once in a while, we have you keying down
here.
CASPER Thank you, Tony. We appreciate it.
CAPCOM And, Apollo 16, we were a little late
on acquisition, there. We'd like you to verify that your
High Gain is set up on zero pitch and yaw 170.
CASPER That's where she is. We saw you with
a low signal strength, and -
CAPCOM Okay.
CASPER Okay, but we're in Auto instead of
react.
CAPCOM Okay. Understand.
CASPER Which accounts for it.
CAPCOM Okay, Apollo 16, if you have a chance,
there, we'd like an E-Mod.
CASPER On the way.
CAPCOM Okay.
CAPCOM And, Apollo 16, we've got all we need
for the night. Why don't you press on through there and
then, your presleep - Just record the readouts. Don't
bother sending them down, and we won't bother you anymore.
Just hit the sack. See you in the morning.
CASPER Rog. As the Sun sinks slowly in the
West, we bid a fine farewell to all at MCC.
CAPCOM Rog.
PAO This is Apollo Control. Still about
30 minutes remaining on this frontside pass, revolution
55. However, the crew of Apollo 16 has essentially signed
off for the next 8 hours. Apollo 16 now in an orbit meas-
uring 54.1 by 65.4 nautical miles. Cabin pressure aboard
Casper 5.5 pounds per square inch. Cabin temperature 75
degrees Fahrenheit. At 181:50, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control at 183 hours 12 minutes ground elapsed time into the Mission of Apollo 16, now to start in the frontside pass in Revolution No. 56 in lunar orbit. Orbit is now measuring 54.8 by 66.1 nautical miles. Another hour and 5 minutes remaining on this frontside pass before the Spacecraft goes around the corner to begin Revolution 57. Revolution count starts at 180 degrees longitude, which is directly opposite the Earth's side of the Moon. Orbital weight at the present time is 43,856 pounds, a little more than 21 tons. 6 hours and 16 minutes remaining in the sleep period until the crew is awakened for a rather busy day. Meanwhile, here at the Control Center, the Gold Team, those who aren't busy with planning for the subsequent days' activities are watching a rerun of the EVA III video tape. At 183:14, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control 186 hours 12 minutes ground elapsed time. Some 4 minutes away from loss of signal as the sleeping crew of Apollo 16 nears the end of their 57th lunar orbit. That orbit at the present time measuring 54.5 by 66.2 nautical miles. Cabin pressure during this pass holding 5.3 pounds per square inch at a temperature of 72 degrees. All three crewmen apparently fairly sound a sleep at this time. They have some 3 hours 16 minutes remaining before reveille call. And then a rather busy day continuing to close out the lunar module. Prepare it for it's deorbit and impact maneuver. Jettisoning the ascents stage. Jettisoning of the subsatellite to be left in lunar orbit and then the transearth injection burn late in the day. Propell the command-service module onto earthward track. At 186:14 this is Apollo Control.

END OF TAPE

PAO This is Apollo Control 187 hours 12 minutes ground elapsed time. 2 hours 17 minutes remaining in the crew rest period. Apollo 16 currently early in it's 58th lunar revolution front side pass around the Moon. By medical data on the command module pilot Ken Mattingly and lunar module pilot Charley Duke being received mean heart rates running in the 40's for both men. Cabin temperature in the command module showing 68 degrees. Cabin pressure 5.2 pounds per square inch. New flight plan update is out up through the end of transearth injection. Stand by please. Flight plan update had been published up through beyond transearth injection. There will be a GET update, that is the ground elapsed time will be forced to agree with pre-flight plan. At 191 hours ground elapsed time it will suddenly become 212 hours 48 minutes ground elapsed time. For a change of 21 hours 48 minutes. In other words, during revolution 76 of the pre-flight plan will agree with the real time revolution 65. I trust every one is sufficiently confused. Transearth injection burn will be at 222 hours 21 minutes under the new GET. Delta V at 3368.9 feet per second. At 187:16 this is Apollo Control.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/24/72 CST 9:11 GET 189:29 700/1

PAO Apollo Control Houston. 189 hours 29 minutes ground elapsed time. We're standing by now for a wakeup call to the crew of Apollo 16.

CAPCOM Apollo 16, Houston.

PAO That's CAPCOM Hank Hartsfield making the wakeup call on Apollo 16's 59 revolution around the moon.

SC Hello, there.

CAPCOM Good morning.

SC All ready.

CAPCOM Were you still snoozing?

SC You bet ya.

CAPCOM How's your writing arm this morning?

SC I don't know.

SC Wait till he gets the sleep out of his eyes.

SC Okay, the first thing I want to do, Hank, is to check on the lithium canister. I got, I had some trouble getting that one out of, out of B last night, and let me go down and check that other one before I do anything else and make sure I don't get it stuck. These things are swelling a little bit now, and they've been a little difficult to get to.

CAPCOM Roger, copy.

PAO That's Ken Mattingly aboard Apollo 16 talking to CAPCOM Hank Hartsfield here in Mission Control.

SC Okay, Houston, Charlie's going off BIOMED here for awhile.

CAPCOM Roger.

SC Ken really had a hard time getting that LIOH canister out last night. He had to wiggle it back and forth about 20 times and go and come forward and then he'd push it back, come forward, push it back. Finally got it worked out of there. What he was worried about, and what worried me is, is there a possibility of busting that nylon strap on there off, in which case you'd probably never get it out.

CAPCOM I don't know, John. I'll question them on that.

SC Okay. I think I remember breaking off one sometime a long time ago, and I just wonder if they'd beep that thing up me.

CAPCOM 16, Houston. Is the A side free?

SC I just checked them, Hank. They're both okay now. I had a little trouble getting the one out, let's see, which one was it last night, it was the B, and I had just a little trouble getting the one out yesterday morning, or whenever it was. We made the other change out of A, but it was just a little sticky. It wasn't like this. I think we may have a little extra humidity cause the windows are starting to fog up more often now.

CAPCOM Roger.

SC Okay, I killed the jet monitor, and I am ready to copy.

CAPCOM Okay, Ken, the first change occurs at 189:46 in the flight plan.

SC Okay.

CAPCOM Okay, at 189:46 and at - image motion on, mapping camera on, and you might make a note there to perform this before opening the mapping camera laser altimeter cover. What we're going to do here is to turn the camera on before we open the door and use the gamma ray boom as a reference. They want to try to get an idea of what's happening on this extend retrack on the mapping camera, and later on we'll do the same thing. We'll turn the camera on and retrack it all the way with it running and close the door before we turn it off.

SC Aren't you guys clever.

END OF TAPE

SC Aren't you guys clever.
SC Okay.
CAPCOM Okay, at 189 51, delete image motion on, and delete mapping camera on to start. Change the image motion in --
SC Okay, I'd better get my maneuver going here before doing anything else.
CAPCOM Okay, press on with that and let me know when you're ready to go again.
SC Okay.
SC Would you check my logic power on 181, please?
CAPCOM Yes, sir.
SC Okay, I didn't think I got to them last night to turn them off. There's two gartered switches down there on the bottom row.
CAPCOM Ken, are you on VOX C this morning?
SC Yes, sir. Thank you.
SC Okay, Hank, while I'm getting this roll going, why don't you give me some more of that stuff? The last thing I copied was the deletion that 189 50 of the image motion and the mapping camera on.
CAPCOM Okay, and the image motion increase change the barber pole to barber pole plus one.
SC Okay, that's BP plus one.
CAPCOM And at 189 57, charge battery A.
SC A charge battery A at 189 57.
CAPCOM Okay. On the next page, at 190 15,
P52 --
SC Before I leave that, Hank, do you have a camera stop time?
CAPCOM Standby one.
CAPCOM Casper, could you give us ACCEPT, please?
SC You have it.
CAPCOM Okay, we're going to send you a new state vector and FAO advises that stop panel be read up with the updates.
SC Okay.
CAPCOM I think -- you, you got your roll altitude now?
SC Yeah. Let me get that straightened out first.
SC Hank, there's no way we're going to make it -- this attitude on time.
CAPCOM It's not critical, Ken.
SC I guess that's agreeable with everybody. But I assume that -- we might just well hold off on this camera extention and all that till daylight. It looks like it's

SC going to be dark. Do you want to do that right now while we're --

CAPCOM We want to do it now.

SC We'll just do that? Get that attitude and then take whatever flighting happens to be out there?

CAPCOM We'll do it now.

SC Okay. Okay, let me -- that -- it'll work. No, it's still daylight. Make sure it should be.

SC Yeah. Okay. Get -- is it dirty?

SC Yeah, you got it all dirty.

SC IMC is on, it's barber pole and gray. The mapping camera is coming on, mark. The laser altimeter door is coming open, mark it. Barber pole, gray. Mapping camera is going to extend, mark. It's barber pole and running. Get the camera ready shield off and the laser altimeter on. Okay, image motion is set, and ready to copy some more.

CAPCOM Okay, 190 15. Next page. P52 option --

SC Go ahead.

CAPCOM Followed by GDC align.

END OF TAPE

SC Okay.

CAPCOM Okay, the next thing occurs at 191 hours. I guess you can get it right at the top of that page CMP open LM hatch.

SC Okay.

CAPCOM At 191 05 may have to use air to get it in there, image motion increase barberpole on.

SC Okay, IMC the barberpole at 191 05.

CAPCOM Roger and for planner about 191 06 we've planned to start reading up the LM changes if we can get through these. At 191 16 from the MSFN uplink block delete the LOPC target load information there in the desired orient.

SC Okay, that's deleted.

CAPCOM At 191 16 you'll have to use arrow -

SC Landing purposes - what book should the LM guys have available to write in.

CAPCOM Okay the LM continues the checklist in the LM timeline.

SC Okay, we'll have those out.

CAPCOM Okay, 191 16 we want to - image motion to barberpole plus 4.

SC Go ahead.

SC Okay, BP plus 4 and 191 16.

CAPCOM And delete the update block at 191 18.

High gain to AUTO.

SC You've got it.

CAPCOM Okay, and I'll stand corrected on that update block. We'll give you a TDI PAD there.

SC Okay.

CAPCOM Okay at 191 33 delete everything down to orbital science photos.

SC Okay, well, that one I can do.

CAPCOM Okay at 191 50 here's where we're going to close that mapping camera up and I guess the best thing to do is just scratch through all that stuff there and write out to the side the order we want to get it in, which is as follows: laser altimeter off, mapping camera retract, mapping camera laser altimeter cover closed, that's after it retracted of course, mapping camera off, and I think you're at attitude now, Ken, if you want to start - it's not at attitude, stand corrected.

SC Thank you sir.

CAPCOM Yeah, it must have bumped a stick there.

And thank you.

SC I'm glad somebody is awake this morning.

CAPCOM Okay after the mapping camera on wait 30 seconds, mapping camera standby. IMC to off. They want to

APOLLO 16 MISSION COMMENTARY 4/24/72 9:26CST 189:44GET 702/2

CAPCOM a VERB 49 to the LM Comm, deep space measurement attitude to arrive at 190 210. The attitude is 322 115 305. High gain angles for AOS ack, pitch minus 35, yaw 238. And along about 213 - stand corrected - 191 55 want to start transferring equipment to the LM.

SC Okay, now give me that time that you've got to be in attitude again. I didn't get that one.

CAPCOM 192 10.

END OF TAPE

SC Okay, and you didn't say anything about the X-ray. Do you want it to go to standby?

CAPCOM We want to leave the X-ray on.

SC Okay, so all the rest of that block up there, I delete, right?

CAPCOM That's affirmative.

SC You leave the Alpha particle cover open and all that. Okay, I'll just delete all those guys and let me read you what I have. That's the laser altimeter starting at 191 15 with the laser altimeter off, mapping camera to retract. And when it's in the mapping camera laser altimeter cover is to close, the mapping camera then comes off, and we go through a little ditty of 30 seconds standby IMC off. While we're doing this we can go VERB 49 to the attitude 322115305 AOS high gain angles will be PITCH minus 35, YAW 238, I need to be in attitude by 192.10, starting about 191 55 you want to start transferring LM equipment.

CAPCOM That's affirmative. Now, if you'll make a little note there, go to 214 hours, page 323.

SC Go to - say again?

CAPCOM 214 hours, that's on page 323.

SC Ahah. Okay.

CAPCOM Okay, I'm going to give you both times and if you like you can write in your clock times over these. 214 hours becomes 192.10 -

SC Hey, Hank, I'm getting confused. Would you give me an overall picture so I can have some perspective of what we're doing. It would sure make it a lot easier, I can copy this line by line, but I'll never keep it all straight here.

CAPCOM Okay, we're going to do the items in the flightplan up to 192, and then we're going to go over to 214 hours in the flight plan and pick up these items in there till we get over to about 216 15, and then we're going to jump back to 176 55 and pick up the LM jet procedures. And when we get through with that we're going to jump back to 217 -

SC Okay, just a second now, wait a minute, let me absorb what you're saying. Okay, Hank, when you say you're going to pick up these things over here at REV 72. I guess you're looking at all these visual targets and photo targets.

CAPCOM Actually, we're scrubbing most of that.

SC And of those - oh, okay, alright - I was going to say, cause we're in - we're on a ground track that isn't very compatible with some of those things. Okay, so then you're going to do that and then you're going to do

SC That and then you're going to go back and do the LM jettison, and then come back up to the subsat.

CAPCOM Roger. And we're trying to work out a -

SC Okay.

CAPCOM Somewhere in here some place to get all this to look right.

SC Okay, the trick of the year. Can you do that with A clock sync? You're even better than I thought you were.

CAPCOM Nobody down here -

SC Alright, let me -

CAPCOM Nobody down here knows what time it is now.

SC Don't tell us things like that. Let me - alright, let me - so we can make sure we're all talking in the same hours, I would like to do like we did the other day and correct the times in the flight plan that are printed now to be the times that we'll really do it. And then you talk to me in times that we'll really do it, and forget what it says in the flight plan.

CAPCOM Okay, I'll do that.

SC That worked out real good with rendezvous. Okay, so now the pages I need to fix the times on are going to be starting at page 323.

CAPCOM That's affirmative and -

SC And 214 hours will be -

CAPCOM 192 10.

END OF TAPE

SC (garble). Oh, oh, 192 10.
CAPCOM That's affirmative. You have to subtract
21 hours and 50 minutes from these times.
SC (laughter). (garble) soup is having
a field day. Okay this will take me a few minutes, but I'll --
I'll get there.
CAPCOM I'm considering to resigning after this
shift.
SC (laughter). Okay just a second I (garble).
I'll get this page done and then we can work on it and I'll
be right with you. Okay let's see.
CAPCOM Ken, can we get a shield around gamma
ray?
SC Yes sir. (garble) 98. Thank you. It's
on 8.
CAPCOM Do the attitude now, Ken.
SC Thank you. Hang on a second. How about
L3?
CAPCOM Say again, Ken.
SC I'm sorry. We got -- we got a lot of
things going at one time here. Okay I've got page 323
times corrected. Now if you want to -- if you want to correct
those -- those events before I work on the next page?
CAPCOM Okay. At 19210 delete the galactic
photo sequence.
SC Okay.
CAPCOM In fact delete everything in that page
and then at 19223 LM activation begins. Actually everything
in the left hand column I should of said should be deleted.
SC Okay LM activation goes where all that
other stuff is.
CAPCOM That's affirmative.
SC Go ahead, Hank.
CAPCOM Okay the next column delete all the
P20 stuff and at acquire MSFN --
SC Okay what this Skylab contamination at
the bottom of the page.
CAPCOM Delete.
SC Okay start over again now in the next
column.
CAPCOM Delete the P20. The MSFN angles are
minus 35, YAW 238.
SC Okay.
CAPCOM Delete the orbital science prep, the
configure camera, etc., and the orbital science. At
19255 there we're going to uplink to the LM just for your
information, a state vector of liftoff time P23 -- P30 load
and P99.
SC Hope that's not a liftoff time.
CAPCOM Negative.

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CAPCOM The computer is yours.
SC Okay thank you.
CAPCOM At 19304 we're going to give you the
LM jettison PAD.
SC Okay. And where will that go? We're
going to go back to the other -- other part of the book.
CAPCOM Roger. You'll copy that at -- on page
283. That's at 17615 on the original flight plan.

END OF TAPE

SC If you're pulling out, I think you'd probably find more behind it there. Okay, Hank.

CAPCOM Okay, on the next page. We need to change all those times again. 215 becomes 193 10.

SC Yeah. Let me see what time that was. Okay, we're -- let me check which battery.

SC Okay, we're charging battery A.

CAPCOM Roger.

SC There.

SC Go ahead, Hank.

CAPCOM Okay, at 193 10, VERB 49 maneuver to LM jet PAD attitude.

CAPCOM Delete the shape target load there in the MSFN uplink.

SC Okay.

CAPCOM Delete the targets to over to the side stuff there and leave the rest of the things in that column and at 193 23, begin suit donning.

SC Okay. And we're all waiting with bated breath to find out what time you give suit donning.

SC 206 25.

CAPCOM I guess there's one ahead of that. I -- let's look here at the next column, 193 40. Delete down through mapping camera laser altimeter covered close.

SC Okay. Are you sure we wouldn't do better starting with a clean page like we did the other day once?

CAPCOM I've been thinking the same thing.

SC I don't mean to be facetious about that, Hank -- cause it seems like I'm doing more deleting than I am writing and it's getting so that damned confused, I may miss writing down -- when it comes time to execute, I may miss something.

CAPCOM Well, if we had to do it over, I think this is what we ought to do. This thing we just handed to me a few minutes ago and it's time to straightened it out. You want to continue with this or do you want to try to solve it?

SC Okay. Well it's -- yes, sir. Let's press on. Let's press on to this sequence till we get the LM jet and see how it works.

CAPCOM Okay, at 193 46, and I guess you're just going to have to write this on the left-hand column and then point over there cause that's what I had to do. We want mass spec ion source off, mass spec experiment to standby.

CAPCOM Okay, Hank. Hank, let me regroup now. I got everything deleted out of all that stuff that's on there down through mapping camera cover closed. That leaves

SC the ALFA cover to be closed. Is that correct?

CAPCOM That's correct.

SC Okay, now read me the right end.

CAPCOM Roger, it's mass spec ion source off.

SC At what time?

CAPCOM 193 46.

CAPCOM Experiment to standby and then there's a little caution, wait 5 minutes before retracking mass spec bottom. Gamma ray retrack, X-ray to standby, and then 193 51, which is your 5 minutes, mass spec retrack.

END OF TAPE

SC Okay, so I've deleted all that stuff that's there, except for the Alpha cover close. At 193:46, we'll take the mass spect ion source and experiments are stand by. Start our 5 minute time. The gamma ray boom gets retracted and the X-ray goes to stand by and after 5 minutes I retract the mass spect boom and the Alpha particle cover will come closed.

CAPCOM That's affirmative. And then you'll do the, you'll do the (garble) heaters on, configure for the dump and the rest of the things there.

SC Okay.

CAPCOM And on the next page at 194:10 -

SC Hey, Hank - okay.

SC This PGA donning with things going on during it, bothers me a little bit. We, this PGA donning in our present configuration is, is a three man effort, even if one man's job is just to get in the corner and stay there, stay out of the way, and I'd like for us to do the minimum activity while we're putting those suits on. If we can do it in the LM, I guess that will relieve alot of the load here.

CAPCOM Okay, I guess we try to do the best we can, Ken, and we'll try to help as much as we can from down here.

SC Okay, it's not so much a problem entirely, it's just keeping track of things and once a guy start putting that suit on, he commands the rest of the volume in the spacecraft. It's a, that A-70B is a real, real interesting operation. If we can use the LM for it, that will help out a great deal.

CAPCOM I don't see why not.

SC Okay, we'll plan to do that.

CAPCOM Okay, at 194:10 delete the P52 and the P20 CMC mode auto G to C aline. Do the PURGES and dump, delete the P30 with a mark there, and then 194:23, we're going to close the hatches.

SC Wait a minute. Did you say delete the dumps?

CAPCOM Negative. Do the dumps.

SC Okay, do the dumps and the PURGE, delete the P52 and the alirment and P30 stuff.

CAPCOM Roger, and at 194 -

SC And now let me write some times on this stage.

SC Okay, Hank. Go ahead.

CAPCOM Okay. At 194:23, we've closed the hatches, and you do the PURGE light heaters off, and terminate the waste water dump, and at this point, we're going to jump into the flight plan. I think that's as far as we ought to go on this REV. We're about 2 minutes from LOS. But at this point, your going to jump back to 176 - 175.

SC Okay, your starting to breakup.

CAPCOM Okay.

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SC Hey, Tony, if you'll give me the time bias to put on that page, I'll have that ready.

CAPCOM We'll catch that the next REV, Ken.

SC Can you give me the time bias so we can, I can do that. Update the times on the page.

CAPCOM We weren't planning on doing that section. We were just going to do all those steps. It's about 45 minutes of stuff in there getting ready for the jets before we do it.

SC Okay. How about the, if I'm standing by with a blank page and just let you read me a new time line.

CAPCOM We'll have it ready for you, Ken.

SC Thank you sir.

PAO This is Apollo Control Houston, at 190 hours 15 minutes ground elapsed time. We've just had loss of signal with Apollo 16 passing behind the moon now, on revolution 59. During this frontside pass, CAPCOM, Hank Hartsfield, passing up a lengthy list of flight plan changes and revisions to command module pilot, Ken Mattingly. We're at 190 hours 16 minutes, this is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control, Houston, at 190 hours 58 minutes ground elapsed time. The flight control team in Mission Control has elected not to do a GET clock update from 191 hours to 212 hours 48 minutes at this time. Not doing this update at this time, we assure continuity and data being processed in the Mission Control Center from the last clock update through TEI. The computers in Mission Control sit and work from a common time. This common time midnight -- the night before launch. This update, if we chose to do it at this time, could conceivably have the effect of making the computers think that we launched Apollo 16 before that time if all elements of the MCC were thoroughly attuned to the update. We were not sure that we had enough time to do that, so, our flight control team elected to be conservative and leave the option open for a clock update later. We're at 190 hours 59 minutes and standing by now for acquisition with Apollo 16.

CAPCOM Apollo 16, Houston. Would you bring us to high gain, please.

CAPCOM Apollo 16, Houston. Could you give us high gain?

PAO This is Apollo Control, Houston, 191 hours 5 minutes ground elapsed time and we're receiving data now from Apollo 16. Our flight director in --

SC Go ahead.

CAPCOM Hello there.

CAPCOM Would you like to finish the updates?

SC Okay. Just a minute.

SC Okay, Hank. I'm ready to copy. I think I need the optics for --

CAPCOM Okay, and the form of review, Ken, when we get to a 192 hours, we're going to flip over to what was originally 214 in the flight plan, and that's going to become 192 10. There's a 10 minute pad in there, and 192 10, we work through those changes down to the part where I read you start hatch closing at 194 23, and 194 27, we want to jump back to the LMP jet procedures, and there is one change in that, so I think that's the best place to go, which was at 176 50, originally.

SC Roger. You want to go at 194 27 is when you want to go the LMP jettison procedures?

CAPCOM Roger, and that's 176 50 in the original flight plan and 176 50 becomes 194 27.

END OF TAPE

dock PGA's and at this time we jump back over to what was -

SC Wait a minute, I haven't found roll 4 off yet.

CAPCOM Okay, that's in the block after P00, after CSM SEP 195 17.

SC 195 17 I have the first number on the top of the page.

CAPCOM That should be 195 07.

SC Okay, I mislabeled it, thank you. Let me redo them. Okay, now at 195 17, say again.

CAPCOM Okay, 195 18 after that completion of that little block, the DN's will roll 4 on, enter a little comment, dof PGA's and go to page 327, that was originally 217 hours in the flight plan.

SC If I ever find my way through here. Okay, I've got page 327.

CAPCOM Are you there now?

SC Yes sir. Now, we want to do all these steps that are down here at 195 20 or so don't we? It says dof PGAs there, but you really want to do all these things that are in that group, right?

END OF TAPE.

CAPCOM Standby.

SC I tried to dry them out. There's a towel that's right over your left shoulder if you need it. If you'll wrap it around there.

SC A good old spaceflight first.

SC Dock them into the --

CAPCOM Ken, I guess I meant to do everything there except dumping the biomed harness and of course, delete the uplinks and the other stuff.

SC Okay, then, we go to page 327.

CAPCOM That's affirmative.

SC Is that right.

CAPCOM And 217 hours becomes 195 10, and that's the time bias from then on if you want to start updating your times. And where we come back in there is that place where we're suppose to uplink the vector -- where we start there is 95 18.

SC Okay, now. 217 is what?

CAPCOM 217 becomes 195 10.

SC Okay. And then we follow the rest of the flight plan all the way out?

CAPCOM Roger. We start at 195 18, actually. We don't do those uplinks, and would you pick that 195 18 and then from then on, we just follow -- sequentially with all open --

SC Why is it that there is no uplink in that?

CAPCOM Well, I've been advised that there's another flight plan change coming that's going to move the subsat locks back a little bit and to get in some mapping camera stuff.

CAPCOM Okay, I got it straight now. We will not track the subsat.

SC We will not track the subsatellite. Not even a little bit, is that correct?

CAPCOM That's affirmative. They're going to run the cameras to try to use the film.

SC All right, Hank. How about doing one thing for us then? If this is going to be the basic time line, and we're going to use these pages, is it reasonable to get you to give us a clock sync somewhere so we -- I'm afraid if I keep stretching out time zone here, I'm going to miss something important.

CAPCOM Well, Ken, to fill you in on a little bit here, we originally planned a clock sync and that's why in some of the confusion this morning, then, we found out that it wouldn't work because it put the liftoff time

CAPCOM for priority time of midnight and we weren't sure it would work and we couldn't find out in time enough before we had to start giving you this up to the LM jets, so, we're going to work on that possibility.

SC Okay, but for the time being, let's just take one plan and run with it and that is to update the times on every page.

CAPCOM That's what we're doing.

SC Once we -- yeah, okay. Okay. All right.

CAPCOM Do you have your NOUN's 93, Ken?

SC You want to talk to the LM guys while I do some page updating?

CAPCOM Do you have your NOUN 93's and the P52?

SC What do you need, Hank? Oh, you want our -- well, let me find it. I don't know what page it is on now.

SC You put them up there.

SC How's the Delta P?

SC Okay.

SC Here we go, Hank. There was minus .1 plus .002 plus .095 -- that was part 190 21 00.

CAPCOM Roger, copy. And we need barber pole plus 4.

SC Yes, sir.

CAPCOM And, Ken, the last thing that you can give us AC roll and we're -- and then we'll be ready for the LM updates.

SC Okay, AC roll.

END OF TAPE

CAPCOM 16, Freddo's going to read up the LM changes so give us the word whenever you're ready to copy.

SC Okay, standby. Hank, I'm a little confused. It looks like in places we've got a 12 minute difference and in other places we've got a 10 minute difference in the times that are marked on here. Is that correct? Did I interpret that properly?

CAPCOM That's affirmative. We go back to the LM jet procedures, just - you know we fitted in to fit with the actual jet time so that time difference is correct.

SC Okay, so does that mean things like AOS and all that will move the same amount or is that different?

CAPCOM We plan to give you updates on those as we go along.

SC Okay.

CAPCOM 16, Houston.

SC Go ahead, Freddo.

CAPCOM Okay, we got quite a batch to give you here out of the contingency book in the timeline. And I guess you'll have to drag out a different color writing utensil then you used yesterday because you're going to be writing over somethings you already did on the timeline book.

SC Well, right now, we'll have to stand by for a minute.

CAPCOM Okay.

SC We've got all colors, especially black, Freddo.

CAPCOM That's nice.

SC Okay, Fred.

CAPCOM Okay, is this Charlie?

SC How's that Fred, how are you reading me, now?

CAPCOM Okay, loud and clear, Charlie, and where you need to be is on page 2-1, phase 1 of the module on activation.

SC That's where I am.

CAPCOM Okay, right at the top there, when you IVT to the LM, there's a note that says, "Use the CSM comm umbilical." As bad as that LM's comm has been, we're not really going to be in good shape there until almost before LOS, when we get to a steerable attitude. Okay, and otherwise there -

SC Okay, what do you mean?

CAPCOM Okay, in step 1, you can scratch the second line, and write in - carry CSM 02 hose across.

SC Okay.

CAPCOM Okay, at the end of step 2, and incident-
ly, we need the hose cause we're not going to bring on the
suit fans. At the end of step 2 there, put a note in that
says to give us the CB configuration on 11 and 16, and I
guess all we really need is the ones closed cause there
shouldn't be too many that are closed.

SC Okay.

CAPCOM Okay, item 3, first line, make that
ascent H20, and the second line, make it the -

SC That's reasonable.

CAPCOM And likewise the second lines number
1 ascent 02.

SC Okay.

CAPCOM Okay, you can scratch the cabin repress
to AUTO, the next line, and substitute press regs A and B
to Egress and that is indicated as being a verify.

SC Okay.

CAPCOM We'd like to retain the next line there
to cabin repress breakers so you've got precautional warning.

SC Add.

CAPCOM Okay, another little block, you might
write out to the left there, label it transfer items. And
maybe you've already done some of these, but this will take
care of the ones we missed having to do yesterday. And
that's PDK, the flight kit.

END OF TAPE

CAPCOM The flight data file. The purse with the unused food and the used pecco urine bags, and lastly the DSEA.

SC Okay.

CAPCOM Okay, beside the sub heading near power transfer write in 192 15.

SC Okay.

CAPCOM Okay, now that whole block that says if no CSM power we're going to use to effect the transfer except for we're going to change it around so you can just scratch that if no CSM power. Go down -

SC Okay.

CAPCOM Go down to the fourth line and change the ascent ECA control close to ascent ECA close.

SC Okay.

CAPCOM After that add a step that is cross tie buss and balance loads open.

SC Okay.

CAPCOM Now that's going to temporarily wipe out the LMP buss but don't worry about it. The next step is BAT 5 normal feed on so we'll get it back there. Okay.

SC Okay.

CAPCOM After the BAT 5 step add in and you'll have to write it out to the left there, I guess, CSM LM power OFF, followed by BAT 6 normal feed ON talkback gray.

SC Okay.

CAPCOM Okay out beside CB 11 and 16 EPS scratch the first line there, that's descent ECA control too close.

SC Okay.

CAPCOM Okay, and then starting 2 lines down where it's BAT 1, low voltage on, et cetera, just scratch the whole rest of those lines in that box.

SC Okay.

CAPCOM Okay, below that step 1 the transfer to LM power you can scratch all of those lines, all five.

SC Okay.

CAPCOM Step 2 flood lights to ALL but then scratch the next three lines.

SC Okay.

CAPCOM Okay, page 22 under step 1 you can scratch everything in parenthesis.

SC Okay.

CAPCOM Under step 2, line 2 scratch descent ECA control close.

SC Okay.

CAPCOM Then all four items that are under CB16 stat control from there on those four lines scratch.

SC Okay.

CAPCOM Okay now the next step 3 items plus the block there about when buss volts less than 27, high voltage

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CAPCOM tab scratch all that clear on down on the
ECS activation.

SC Okay.

CAPCOM PCS activation, SEP 1 third line CB-11
you can scratch - standby one. Okay, Charlie, that's correct,
CB11, PCS sup pan 1 close scratch that line.

SC I got it scratched.

CAPCOM Okay and the circuit breaker below that
glycol pump cue close change the tube to one.

SC Okay.

CAPCOM Okay, then the next two lines at the bottom
there, press REG A and B two guess diverters, scratch those.

SC Okay.

CAPCOM Add a line below that glycol to pump 1.

SC Okay.

CAPCOM Okay, ready for 2-3 and step 2 you can
scratch the first line about - if LM is to be active, et cetera.
And just leave the time of that flow one open. That's step 2
now.

END OF TAPE

SC Okay.
CAPCOM Okay, configure AUDIO block here. Delet
steps 1 and 2.
SC Okay.
CAPCOM Okay, step 3, the second line, commander
AUDIO close, scratch that one.
SC Okay.
CAPCOM In it's place, write in secondary power
AMP close.
SC Okay.
CAPCOM Next line, signal sensor close, scratch that
one.
SC Okay.
CAPCOM Okay, let's go to step 4. On the S-band -
SC Okay.
CAPCOM Across there, it should read PM secondary and
change primary to secondary.
SC Okay.
CAPCOM Okay, the second line there, rather than
"off reset", make it "range".
SC Okay.
CAPCOM And rather than "low", make it "high".
SC Okay.
CAPCOM And since you're not going to be plugged in,
you can scratch that "hot mike" to "MSFN".
SC How about that.
CAPCOM Yea, well really miss that. Okay, Charlie,
the next line S-band antenna, we want forward. So you can
scratch the RF.
SC Okay.
CAPCOM Next block caution and warning turn on. Under
the warning light, the RCS A rig, they put a parenthesis here, it's
possible, and you can scratch RCS B rig.
SC Okay.
CAPCOM Under caution lights, you can scratch pre AMP.
SC Okay.
CAPCOM Okay, and under the glycol note you can add
two more caution lights: RCS and ECS.
SC Okay.
CAPCOM Okay, let's go to the circuit breaker page.
2-4.
SC Okay.
CAPCOM Let's go 3 row down. The change -
SC Okay.
CAPCOM The change there will be attitude direct
control breaker should be open, and logic power A should be open.
SC Okay.
CAPCOM So your 5 closed will be 3 closed.
SC Okay.

CAPCOM Okay, the next row down, the 4th row, suit fan one breaker should be open.
SC Okay.
CAPCOM Sounds like you're not quite awake yet there, Charlie. And one more on that row -
SC Everybody else is putting me to sleep.
CAPCOM Okay. Secondary S-band power AMP should be close.
SC Okay.
CAPCOM Okay, the bottom row, Charlie. The descent echo control and the descent echo both open.
SC Okay.
CAPCOM Okay, the next page, panel 16.
SC Go ahead.
CAPCOM Second row, logic power B should be open.
ASA open.
SC Okay.
CAPCOM Third row, suit fan 2 opened. Diverter valve open, CO2 sensor open.
SC Okay.
CAPCOM Okay, and the bottom row, descent echo, descent echo. control open -
SC Go ahead.
CAPCOM And the cross ties closed.
SC Okay.
CAPCOM Cross ties bus and bound loads closed.

END OF TAPE

SC Okay.
CAPCOM Okay, and the docking tunnel index, I'd like to get started to work on something there.
SC Okay, standby and John will go get it.
CAPCOM Okay.
SC Plus 4.5, Freddo.
CAPCOM Okay, plus 4.5. Roger. Okay, let's go to 2-6, which is a pretty easy page.
SC Here I am.
CAPCOM Okay, all you do is retain the top line, the RCS system A/B to AUTO, scratch the whole rest of the page.
SC Okay.
CAPCOM 2-7.
SC Go ahead.
CAPCOM Okay, a note at the top, CSM maneuver to steerable attitude, if not there.
SC Okay.
CAPCOM Okay, jump down to the S-band steerable antenna activation, step 2.
SC Okay.
CAPCOM Scratch high gain PITCH and YAW angles there.
SC Okay.
CAPCOM You can scratch the "wait 30 seconds after slew." We've tried that trick several times, and write in a PITCH angle of 155 and a YAW of minus 12, the only one you can get.
SC Alright, okay.
CAPCOM Step 3, scratch track mode to AUTO.
SC Okay.
CAPCOM Okay, down at PNGS turn on now, step 1
SC Go ahead.
CAPCOM Starting with the B35 ENTER, scratch the rest, including the B35 ENTER.
SC Okay.
CAPCOM Okay, the next page 2-8.
SC Go ahead.
CAPCOM Scratch the whole PNGS self test section there steps 1 through 5.
SC Okay.
CAPCOM Okay, let's go to circuit breaker page 2-9.
SC Okay.
CAPCOM Row 3 after PNGS, CLOSED and attitude direct OPEN, logic power A, OPEN.
SC Okay.

CAPCOM Next row down, the fourth row, suit fan
1 OPEN, up data link CLOSED.
SC Okay.
CAPCOM The last row, descent echo control, de-
scent echo, both OPEN.
SC Okay.
CAPCOM Panel 16, second row from the top, logic
power B OPEN, ASA OPEN.
SC Okay.
CAPCOM Okay, the third row, we want the A trans-
mitter and B receiver CLOSED. We're going to get some VHF
ranging.
SC Okay.
CAPCOM And the prime S-band power amp and trans-
mitter receiver breakers both OPEN.
SC Okay.
CAPCOM Way over to the right there - suit fan 2
and diverter valve and NCO 2 sensor all 3 OPEN.
SC Okay.
CAPCOM Bottom row, it's descent echo, descent
echo control open, and the crosstie bus and balance loads
both closed.
SC Go ahead.
CAPCOM Okay, fantastic. Page 2-11 doesn't
have any changes.
SC Amazing.
CAPCOM Let's go to 212.
SC Go ahead.
CAPCOM The DHF checkout section, scratch the
whole thing, steps 1 through 4.

END OF TAPE

SC Okay.
CAPCOM T213 is another easy one. You can scratch the whole page.
SC Okay.
CAPCOM Start at 214 and PNGS AGS alined. You can scratch that whole section there and all 4 lines. And before you turn the page, there, we need the right-end down at the bottom of that page. Up data length to data.
SC Okay.
CAPCOM Followed by a MSFN uplink and if you're interested in what that is, it's a state vector on LGC time. P30 and a P99 load.
SC Okay.
CAPCOM Okay, after we get done with the uplinks, put CSM maneuver to jet attitude. That's in select forward OMNI.
SC Okay.
CAPCOM Okay, you got the select forward OMNI.
SC Yeah.
CAPCOM Okay. At --
SC Okay, toward jet attitude.
CAPCOM Go ahead.
SC Wait a minute, Fredo. We maneuver to jet attitude and select forward OMNI?
CAPCOM That's prompt, Charlie.
SC Okay.
CAPCOM We just went to the steerable attitude so we can get all these uplinks in.
CAPCOM Okay, then we -- next note is verify jet attitude CSM narrow deadband at hold.
SC Okay.
CAPCOM Then its window shades, three closed. That's to keep the heat leak down for that eight hours loiter time in the LM has to do.
SC Okay.
CAPCOM Then we'll go to LM time line book page 14 right-hand column.
SC Stand by. Hey, you ought to write that note there, Charlie, so --
SC Okay.
SC Yeah. I got it.
CAPCOM Okay. The whole left column there is just scratched and I guess they need to know what kind of shape you're in over on the right side and I understand you scratch through a bunch of this already.
SC Yeah, but I think I know what to do

SC just target the things and get a go
for closeout, looks like it's all I got to do.

CAPCOM Yeah, okay. If you're ready, then,
at step one, there, delete --

SC Go ahead.

CAPCOM Standby one, Charlie.

CAPCOM Ken, it's about 30 seconds to start
bringing up the SIM bay configuration.

SC Well, if the hat can do that for us,
okay. I'll try to get over there as fast as I can, and
I'd like to ask some clarification. I just turned off
2 hydrogen fans -- their heaters -- the way the pan had
nothing in the way of fans or tank heaters.

SC I think you're little -- don't hit
that big edge.

CAPCOM Okay, I'll continue on here while
they're thinking about that, Ken. Charlie, step 4 there
scratch the V47 inter, et cetera, and substitute with the
VERB 77 inter.

SC Okay.

CAPCOM Scratch step 5.

SC Okay.

CAPCOM Under target PNGS, there step 1 --

SC Are you going to read it?

CAPCOM AGS after the third line there, too,
V96 enter.

SC Okay.

CAPCOM Scratch your configure AGS step one
there.

SC Okay.

CAPCOM Let's go to page 50.

SC Go ahead.

CAPCOM Okay, configure LM for jets step 1,
AGS remote control at hold, fourth line down, scratch it.

SC Yeah, okay.

CAPCOM And line 6, inverter 2, verify inverter 2,
scratch that one.

SC Okay

CAPCOM The --

END OF TAPE

CAPCOM Go to step 4 now.
SC Okay.
CAPCOM Scratch the 3rd line. CB11 comm.
SC Okay.
CAPCOM Scratch the 4th line, and the 5th line and
the 6th line.
SC Okay.
CAPCOM Keep then cabin gas return to EGRESS, you
have to write that in.
SC Okay.
CAPCOM And the suit gas diverter to EGRESS.
SC Okay.
CAPCOM Okay, that's it on that page. Let's go to
page 16.
PAO This has been Fred Haise, the backup commander
of Apollo 16 passing up these changes.
CAPCOM (garble) S-band antenna open. AGS AC bus B
open.
SC Okay.
CAPCOM 4th row down, secondary S-band power AMP
closed.
SC Okay.
CAPCOM Let's go to panel 16 on page 17. Second
row. It's ASA open. I'm sorry. Let's back up one. It's AEA
open first, then ASA.
SC Yea, okay.
CAPCOM Then ATCA.
SC Yea.
CAPCOM ATCA open, and ATCA AGS open.
SC Okay.
CAPCOM 3rd row down, the primary S-band power AMP
open. S-band antenna open.
SC Okay.
CAPCOM And the one on the far right.
SC Okay.
CAPCOM Far right one CO2 sensor open.
SC Okay.
CAPCOM And the bottom row. S-band heater, under
heaters S-band antenna open.
SC Okay.
CAPCOM Okay, and then inverter 2 should be open.
SC Okay.
CAPCOM Okay, and I guess you've got the idea here,
Charlie, that everything else is indicated on this, you're going
to have to configure. Like a bunch of these you're going to be
closing.
SC Yea, I know.

CAPCOM Okay. Okay, page 18.
SC Okay.
CAPCOM Under IVT to CSM delete step 1.
SC Yea, guess so.
CAPCOM Okay, step 2. I guess the way you want to
suit, with that transfer to CSM step, 5th line there under step
2, you can scratch and write it as don suits and then transfer.
SC Okay.
CAPCOM Okay, then everything -- we'll end the CSM
transfer list. The rest of that column on the left side and the
whole right side, we can scratch. If you wanted to, I guess you -
SC Okay.
CAPCOM You could use it for one final verification
there, Charlie, but we should have picked all those items.
SC Okay.
CAPCOM And that's it.
SC I got one question, Fred. Have, on the PPK's
I took a peek at them and there was only 1 bag in there, and it
says 3 here. Are we only suppose to have one bag?
CAPCOM I'll check that, Charlie. Stand by.
CAPCOM Okay, the word I get, Charlie, is there is
only PPK pack.
SC Yea, I thought so, but I just wanted to make
sure.
CAPCOM Must have been a small cannon ball.
SC Yea. (Laughter) Okay, lock, I'm going on
over to the LM and get started on this stuff, okay.
CAPCOM Okay, that sounds excellent, and I guess we
need to talk to Ken now.
SC Okay.

END OF TAPE

SC Hey Ken, could you turn off my VOX, please.
SC Okay, open hatch.
CAPCOM Ken, I don't know where you are on the procedures now but it is about time to start that maneuver if you get a chance.
SC All right, Henry, I'll be there in just a minute. I just finished your SIM bay stuff and Henry did you have an ECOPS, check and see if our circuit accumulator looks like has been working properly in the last hour.
CAPCOM Okay, will do.
SC Okay, ECOM says that they can see it's receiving the stroke signal but they have no way of telling if it really does stroke.
SC Okay, seems like it has gotten all the stuff and the humidity has built up a little bit and I was just wondering is there some way I could verify that it is working without having to watch this isle 2 flow arm, watch the L2 flow sensor contain. They have the flow sensor, can they tell if it - if it's been getting it's flow volts?
PAO This is Apollo Control Houston 192 hours ground elapsed time. Mattingly will shortly be maneuvering Apollo 16 to a LM COMM attitude.
SC I'm checking that it's working and it's stroking. He suggests maybe we go over AUTO 2 and see if that improves things.
SC Okay, I'm in AUTO 2 now. I think I can adapt to narrow DEADBAND.
CAPCOM Roger.
PAO And the other two crew members apparently transferring equipment from the lunar module.
SC Orion.
CAPCOM Go ahead.
SC Okay, the CB's are in as per page 313 and 314. Stage deactivation that we left them last night at moon.
CAPCOM Roger, copy.
SC No, I put in my own.
CAPCOM Ken, it only took your mapping camera 2 minutes and 28 seconds to retract that time.
SC Yeah, we noted that.
CAPCOM Ken, while you are maneuvering there I'd like to get a quick check on the cowl configurations.
SC Okay.
CAPCOM What we'd like to have is O2 heaters 1 and 2 OFF, 3 AUTO.
SC O2 heaters 1 and 2 are OFF and 3 is in AUTO.

CAPCOM And hydrogen tank heaters 1 and 2 AUTO.
And all three fans off.

SC Okay hydrogen heaters 1 and 2 in AUTO and
the three fans are off, thank you.

CAPCOM Okay, and we should be on the 100 watt
heaters.

SC That's what we've been running on - I don't

CAPCOM Ken, the lyle canister you had trouble with.
Has it already been put in the LM foot yet?

SC No sir, I've got it stowed on board.

CAPCOM Okay, real good, we'd like to bring that
thing home.

SC It was the one I took out last night, it
should be - okay, I had a little trouble with the one yesterday
morning but not so much, and it's already in the LM. Last
night I was getting concerned, we picked up some humidity
and it was swelling.

CAPCOM Roger.

SC Okay, Ken, what we'd like to do is get
canister number 13 to the LM and place the one we're bringing
home.

SC Say again, Henry.

CAPCOM Did you make a substitute for the one that
you're going to keep there or -

SC I'm sorry I still haven't understood you.
Say it again one more time, please.

CAPCOM Okay, we're going to keep the canister that
bad, we're going to bring it home so we can look at it so -

END OF TAPE

CAPCOM Did you substitute another one to be jettisoned with the LM?

SC No sir. I packed all that stuff yesterday sometime and it's over in the LM in a jet bag and if we have extra canisters I'd just as soon leave it that way if we could.

CAPCOM We concur.

SC We're having enough trouble staying up the time line without digging through a jet bag looking for a canister.

CAPCOM We don't want to do that.

SC Easy on that, baby. (garble). Okay Hank. You got the one that stuck last night? It's down in -- in A -- A3 I believe it is, the first one. And let's leave it at that.

CAPCOM We concur.

SC Okay and Orion's back on internal power at 19206.

CAPCOM Roger, copy.

PAO That report from Ken Mattingly verifying that Orion has been powered up once again at 182 hours 6 minutes ground elapsed time.

SC Man Henry, we're not going to be in attitude until 192 14. Is that acceptable?

CAPCOM That's okay.

CAPCOM 16, Houston. We have a block data we need to get up for LOS. Okay 16, we're about 2 minutes from LOS. I don't think we can get it in now. We'll give it to you next rev. AOS will be at 194 -- 193 -- 192 58.

PAO This is Apollo Control Houston. At 192 hours 13 minutes ground elapsed time. We've had loss of signal with Apollo 16. As the spacecraft and crew pass over the backside of the Moon on the 60th revolution. This is Apollo Control Houston.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/24/72 CST 12:23 GET 192:40 718/1

PAO This is Apollo Control Houston. At 192 hours 41 minutes ground elapsed time. A new release concerning approval of a second set of reports by joint working groups of the United States and the Soviet Union on studies of compatible rendezvous and docking systems is now available in the Apollo News Center. To repeat that announcement our new release concerning approval a second set of reports by joint working groups of the United States and the Soviet Union on the studies of compatible rendezvous and docking systems is now available in the Apollo News Center. This is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control Houston at 192 hours 58 minutes ground elapsed time. We're less than a minute away now from reacquiring Apollo 16. We'll leave the line open, standby and monitor. We are now receiving data from Apollo 16. Apollo 16 now on it's 61st revolution around the moon.

CAPCOM Apollo 16, Houston.

SC Go ahead, Henry.

CAPCOM Roger, how is it going?

SC Well, we're waiting for some LM stuff, I guess.

CAPCOM Okay, your PADs are really turning in the work. I think we can clean up a few things now. We need the NOUN 20's on page 212 Tennessee checklist, I guess from the LM.

SC Okay, Hank here we go with the 212 the NOUN 20's were for the command module. 332 94 116 31 304 99. In the LM 340 91 296 73 054 43. Over.

CAPCOM Roger, copy and the GET.

SC Okay at 192:36.40.

CAPCOM Roger, copy.

SC Okay, Hank, we're ready for the uplinks - we're sitting in high bit rate, we've got data and good signal strength, you should be able to sock it to us.

CAPCOM Roger, Charlie and they are not quite ready with those uplinks.

SC Okay, Hank. Let me ask a question, over.

CAPCOM Go ahead.

SC Okay, did it occur to anybody down there that last night if we'd stayed powered up we could have gotten rid of this contraption and it wouldn't have taken up all this time today. Or was that ever discussed?

CAPCOM It was discussed and the decision was made power down.

SC Yeah. Well, we're going to do about 4 times the work to do whatever it is they would have done. And I'm not really 100 percent sure we're going to be right on this because we never practiced it.

CAPCOM Roger, understand. And we'd like to get the S-band voice function switch off on Orion.

SC It's off. And the COMM configuration you read me was the downvoice backup.

CAPCOM Roger, we want to get a little ranging and we'd like to verify who was on biomed last night.

SC I guess all of us were, weren't we? I think we all were, Hank.

CAPCOM Okay, understand all three.

SC Can't you tell?

CAPCOM I guess for some reason they didn't copy the CDR.

SC Well, it was plugged in. Hank, we've got a - the vacuum cleaner stalled out sometime on us and if you guys want it back for Beta analysis we'll bring it back, otherwise we want to toss it out. Do you have any thoughts on that?

CAPCOM We'll check into it Ken and would you by chance have a crew status report?

SC No, Henry I haven't gotten around to doing that kind of book work yet. Can we just sort of let that go for a while?

CAPCOM Affirmative.

SC We're all here.

CAPCOM Okay, I have a TDI 63 PAD I'd like to get up, block data.

END OF TAPE

SC All righty. Go right ahead.
CAPCOM Okay. TEI 63, SPS G&N 38491 plus 067 plus 097, 198 33 2008 plus 31867 plus 07316 minus 01189, 181 083 015, the rest is NA, ullage 2 jets 17 seconds, asset REFSMMAT assumes set maneuver.
SC Okay, TEI 63, SPS G&N 38491 plus 067 plus 097, 198 33 2008 plus 31867 plus 07316 minus 01189 niner, 181 083 015, two jets for 17 seconds from the FM REFSMMAT and assuming set maneuver.
CAPCOM Good readback, Ken.
SC I am too full, and I can't figure out why.
SC Maybe cause you've just been sitting there.
SC At 4.
SC I turned it off a long time ago, John.
SC If that's the only problem, you're right, but high open flows are caused by, I think, -- I don't care about the end results.
SC I've already done that.
SC Our cabin has dropped to (garble) that's why the flow is up. Maybe last night which I think you got something this morning. That ought to tighten it up. Both ceiling tapes.
CAPCOM Ken, if you -- wanted to get you a flight plan in order. If you took pages 283 for 286, or just stuck them between 326 and 327, they should be all in order.
SC Okay. Page 283 -- Okay, Hank, that's page 283 through to 285 and --
CAPCOM Roger, and just insert those between 326 and 327 and then you'll be in order just to flip the pages.
SC That's a good plan. We should have thought of that.
SC And, Charlie, I have your time line torquing angles for page 214.
SC Would you standby just a second, please?
SC Okay, Hank.
CAPCOM Roger. Plus 02620 plus 07950 plus 04770.
SC Is that a good readback, Hank?
CAPCOM I didn't read you, Charlie.
SC Okay, I read back plus 02620 plus 07950 plus 04770, over.
CAPCOM Roger, good readback and we'd like to get another set of NOUN 20's after you torque those.

END OF TAPE

SC Okay, Hank, our book is rearranged.
Per good suggestion. That should help a great deal.
CAPCOM Roger.
SC And can you give me a jettison pad, yet?
CAPCOM They're working on the pads, Ken.
CAPCOM Looks about like 10 more minutes.
SC Okay, I just noticed I'm supposed to
be there already.
CAPCOM Ken, the decision is to bring the vacuum
cleaner home with you.
SC Okay, Hank, I'll bring the vacuum cleaner
home.
CAPCOM And Charlie when you get to NOUN 20
just hold them and we'll copy.
SC Okay, Hank, here's the map.
SC Okay, I was just going to read them
to you. We got them.
CAPCOM Charlie, we have the NOUN 20's.
SC Okay.
SC Hank, I'd also like to verify if it's
okay to leave the CSM to LM umbilicals hooked up in the
tunnel?
CAPCOM Okay, I'll check that out. And, Ken,
to give you a few more words on that -- cancelling that subsat
tracking, we're trading that off for photography, mapping
camera and pan camera and X-ray and we're getting 16 degrees
more of the lunar surface that's never been photographed
before.
SC Okay.
CAPCOM And Ken, it's okay to leave the umbilicals
hooked up.
SC All right, thank you.
CAPCOM 15, Houston.
SC Go right ahead, Henry.
CAPCOM Roger, we'd like to verify once again
the docking angle.
SC Okay, we'll read them one more time.
SC You're right. There it is. Plus 4.5 degrees.
CAPCOM Roger, copy. Plus 4.5.
CAPCOM What the problem is there, John, is
we're still getting a torquing angle required and we're
having little problem with it and we're just trying to
figure out what's wrong.
SC Right. You want to check our Arithmetic?
That's probably a possible problem.
CAPCOM Roger. We did another NOUN 20 so we
got a problem with the X -- X axis.

CAPCOM 16, Houston. Charlie, I got a new set of torquing angles for you.
SC Go ahead, Hank.
CAPCOM Okay. Minus 02900 minus 08320 minus 04930 and after you've torqued that would you get us another set of NOUN 20's on the discus.
SC Okay, I copy. Minus 02900 minus 08320 minus 04930.
CAPCOM Good readback, Charlie.
PAO Apollo Control, Houston, at 193 hours 26 minutes ground elapsed time. The Mission Control Center working with the crew of Apollo 16 as they go through their LM activation procedures. Shortly, they should be donning their suits and preparation for hatch closed and LM jettison.
SC Okay, Ken, you have the NOUN 20's on both DSKY's at 193 26 35.
CAPCOM Roger, we're copying them.
CAPCOM Orion, verify data, we're ready with the uplinks.
SC That's verified, Hank.
CAPCOM Orion, your alinement is go.
SC Roger.
CAPCOM And Casper, I have a LM jettison pad.
SC Ready to copy.
CAPCOM Roger. 195 10 all zips, 137 020 016.
SC 195 10 0000, 137 020 016.
CAPCOM Roger. And if you'd flip the page, I'll give your set time.
SC Okay.
CAPCOM Sep Tig is 195 15 all zips.
CAPCOM And Casper, don't do the VERB 49 until we tell you to, please.
SC Oh, very well.
CAPCOM We need to keep the LM calm, if there's a reason.
SC Roge. I understand.
CAPCOM And if you'd flip the page again, I'll give you your subset jet pad.
PAO That's CAPCOM Henry Hartsville talking to the crew of Apollo 16.
CAPCOM 196 13 46, 089246 000.
SC Okay, 196 13 46, 089246 and all zeros.
CAPCOM Good readback, Ken.
SC Okay, can you give me some of these photo pads so I can get them going cause this time after jettison is going to be pretty crowded too.
CAPCOM They're in work --

APOLLO 16 MISSION COMMENTARY 4/24/72 CST 12:54 GET 193:12 721/3

SC Thought maybe we can write down now before we
get all suited up and ready to go.

CAPCOM That's a good plan. I'll try to have
them for you in a couple of minutes and for Orion, I have
the LM deorbit pad.

SC Okay, he'll be with you in just a second,
Hank. He's halfway in a suitwork.

CAPCOM Roger.

SC Okay. Speak to us, Henry, with the pads.

CAPCOM Roger, LMP deorbit, 203 08 0950 minus
02389 minus 01031 plus 02545, NA down to FDAI inertial, 197
023, the rest is NA, LM weight 5275.

SC Hank, Hank, standby. Hey, standby. I
ran out of ink.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/24/72 1:16CST 193:34GET 722/1

SC What did you do with the pen ball I gave you, it doesn't run out.

SC Okay, go ahead. Start with - I got the Delta V's but everything after that I missed. That ought to draw us a couple of Vodka cases.

CAPCOM Okay FDAI is 197 023 the rest is NA.
LM weight 5275.

SC Roger, I copy 203 08 0956 minus 02 389 minus 01 031 plus 02 545 197 023 NA, LM weight 5275.

CAPCOM Roger, and on the NOUN 33 the seconds is 0950.

SC Okay 0950. Does that running out of ink tell you something about the changes we've had, Ken, I mean Hank?

CAPCOM Roger, it does.

SC Yeah, but don't get behind the power curb because this cooling moved down here ain't got much.

SC Okay.

CAPCOM Ken, which PAD is it that you want, those on page 324 don't fly.

SC Okay, you mentioned something about we're going to get a whole lot of mapping and pan camera stuff in there in those revs between there and DEI and I just thought that if we had some idea of what's coming we could do a better job of getting ready for it.

CAPCOM Roger this all occurs on the rev after next.

SC I know I'd like to be able to plan a little further ahead. If you don't get ahead - plan ahead you just run a real good chance of not getting all the things done the way you'd like to.

CAPCOM We agree and I'll try to have some words for you here in a few minutes.

SC Okay, I understand your problem. That's no sweat.

CAPCOM And 16 for your information LOS is at 194 11.

SC Okay.

CAPCOM Orion all your loads are in.

SC Okay, can we start to maneuver to the jet attitude.

CAPCOM Standby. Casper, Houston, we'd like for you to start on the callouts that are at 193 46.

SC Okay, I'll do those now.

CAPCOM Roger, we want look at data on telemetry before we start to maneuver because when we do that we go into low bit rate and an OMNI.

SC Okay.

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SC Okay, the mass spec ion source is off.
The experiment is standby. Gamma ray goes to retract. MARK.
Barberpole, X-ray 2 standby. Okay the alpha and X-ray covers
are coming closed. MARK. They are closed.

CAPCOM Orion, Houston.

SC I haven't got time right now Charlie, he's
calling you.

CAPCOM Go ahead.

END OF TAPE

CAPCOM Okay Charlie. In that setup we forgot to get things configured for auto transfer protection on the glycol system there so I've got a short readout here to make sure that's configured.

SC Okay go ahead.

CAPCOM Okay on panel 11, and I think you're already there -- yours checked, you got pump 1, pump 2 in the auto transfer breaker closed.

SC That's affirm. It's setup.

CAPCOM Okay switch to pump 2.

SC Okay pump 2.

CAPCOM Okay open the auto transfer circuit breaker and then switch back to pump 1.

PAO That's Fred Haise speaking with Orion.

SC You're back to pump 1.

CAPCOM Okay and lastly, Charlie, close the auto transfer breaker and we're back in business.

SC Okay.

CAPCOM Casper we're ready for mass spec retrack.

SC Okay the mass spec is coming in now.

CAPCOM Roger.

CAPCOM Orion, Houston. Did you load your DAP before you started the P30? We need auto in the high gain, Casper. And Ken, our plan for the camera work is at about 196:45, somewhere in there, it's sunrise. We plan to run the mapping camera laser altimeter throughout the daylight part of that rev. Up to about 197:50 and we'll bring the pan camera on at about, oh, a third of the way through that daylight portion about 197:15 and run it to darkness. And we'll do a solar corona just prior to that and maybe some hand held photography, which we'll read up to you after you doff your suits on the next rev.

SC Houston, Orion.

CAPCOM Go ahead.

CAPCOM Ken, it looks like the mass spec is jammed would you gives a 15 second deploy and then a retrack?

SC Houston, Orion.

SC Houston, Apollo 16.

CAPCOM Go ahead.

CAPCOM Apollo 16, Houston. Go ahead.

CAPCOM Apollo 16, Houston. Go ahead.

SC Houston, Apollo 16, over.

CAPCOM Apollo 16, Houston.

SPEAKER Madrid com tech Houston com tech. net one voice check.

SC Hey, Hank, can you read us? 16.

CAPCOM Roger, 16. Houston's reading you.

APOLLO 16 MISSION COMMENTARY 4/24/72 CST 1:27 GET 193:44 723/2

MADRID NET Got a voice, Houston, contact net one.
CAPCOM Got a voice.
HOU CONTROL Okay, we seem to be out with Madrid.
HOU CONTROL Roger, standby.
MADRID NET Casper, this is Madrid (fading).
SC Okay we'll just standby until they get
through with it. Thank you very much sir.
SPEAKER You're welcome. I enjoyed it.
SC How's everything in Madrid.
MADRID NET Ah, everything's fine here.

END OF TAPE

SC Good.
CAPCOM Apollo 16, Houston.
SC Hello, Henry. Glad to have you back.
CAPCOM Roger, we had a little trouble with the network there. It appears that the mass spec room is jammed and we'd like for you to give it a 15 second deploy and then back to retract.
SC Okay, 15 seconds deploy and back to retract.
Standby. Deploy.
CAPCOM How far did it look like it went before it jammed?
SC About a third of the way in.
SC Okay, there's 15 seconds and I'm going to retract.
SC Okay, Hank, Charlie has a beagle on it and it stopped again.
CAPCOM Our data confirms that, Ken.
SC Okay. I've got the switch in the off position now.
CAPCOM Roger. Ken, would you give us one more of those 15 second deploys and back to retract?
SC Okay, how about if I just take it all the way out?
CAPCOM Okay, why don't you go ahead and try it. We have data showing it's stalling both ways. It's going out now. Orion we'd like you to verify forward OMNI before you secure the LM.
SC Okay, Hank it didn't go all the way out and Charlie can visually verify that it is not all the way out.
CAPCOM Okay, would you try another retract?
SC Doing a retract now. Houston can we start the mood maneuver to the jett attitude, over?
CAPCOM Standby 16. 16, Houston, give us a SIM BAY roll jet configuration and start your REV 49. I think that's what you've got in there now.
SC Yes sir it is.
CAPCOM And you are no go for a couple of jets and I think we're going to have to jettison that boom. We're look at that now.
SC Okay, is that a requirement for the 1 jettison you mean?
CAPCOM We'll get you an answer to that. Okay, we've got to keep the boom for LM jet but keep the SIM BAY jet configuration so we don't go couplet.
SC Okay, if we stay in the SIM BAY jet configuration what is this going to do to our translation

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capability for the maneuver, are we going to have to line it all up in one axis?

CAPCOM Roger, Ken, minus X is what we want to do on that SEP maneuver anyhow.

SC Rog, but that's probably not going to line up with the - with the attitude I'm on docking in, is it? Normally that turns out to be a 3 axis burn.

CAPCOM Maneuver to get it all in minus X and then do it.

SC Okay, so you want me to maneuver to minus attitude first.

CAPCOM That's it, we want to get the SEP maneuver all in X and I've got Fido trying to get you in attitude for that.

END OF TAPE

SC Well I could probably figure that out
NOUN 41, I mean B41.

CAPCOM Casper, the final says the maneuver
attitude -- to get that minus 6 thrusters is PITCH 327,
YAW 0 and ROLL, whatever you have.

SC Okay that'll be whatever ROLL we have,
PITCH of 327 and the YAW of 0.

CAPCOM Roger. And we'd liked to remind you
that we need OMNI DELTA for AOS next time and to change
the verify to a configurate. The DSC Acqui LOS to
low bit rate, record forward.

SC Rog.

CAPCOM Apollo 16, Houston. You're looking
good at LOS and AOS will be at 194 57.

SC Roger and we're feeling good too.

CAPCOM And Ken to reiterate -- as far as that
boom is concerned it's the ROLL jets we're concerned with.
There the only ones we have to keep a single jet on.

SC Ken is off com, he's suiting up.

CAPCOM Roger.

CAPCOM Hey John, would you -- would you tell
Ken that on that boom out, our only concern is going coupled
on the ROLL. So when get ready to do this burn, if he just
wants to use X and Z and just leave his wide translation --
you know, make a 90 degree ROLL and burn at Z. Now Ken can
handle it any way he wants, but just let him know that our
only concern is a couple jets in ROLL.

SC Okay I understand.

PAO This is Apollo Control Houston at
194 hours 12 minutes ground elapsed time. We've had a
lose of signal with Apollo 16. As the spacecraft passes
over the backside of the Moon on its 61 revolution the
recalcitrant boom referred to as the mass spectrometer
boom. This item approximately 25 feet in length from it's
stowed position. It is formed by tempered steel tape. It
is electrically connected to the SIM bay via cable at
deployment. If the boom cannot be retracted due to mal-
function the boom activating mechanism, boom and experiment
can be jettisoned. It's location in the service module is
in close proximity to the point of subsatellite deployment
so we would not want the boom extended at the time of
subsatellite deployment. Also because of the limited
mechanical strains of the boom, the boom must be retracted
before any service propulsion system firings. I repeat if
the boom cannot be retracted due to malfunction the boom
activating mechanism, boom and experiment can be jettisoned.
We're at 194 hours 14 minutes ground elapsed time and this
is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control, Houston, at 194 hours 19 minutes ground elapsed time. A new data from our experiments controller indicates that we will be able to launch the subsatellite with boom extended. It does not represent a constraint. The only constraint we're presently faced is the burning of the service propulsion system engine so our cutoff time for retraction or jettison will be the transearth injection burn when the service propulsion system engine would be used. We're at 194 hours 20 minutes ground elapsed time and this is Apollo Control, Houston.

END OF TAPE

PAO This is Apollo Control, Houston, at 194 hours 56 minutes ground elapsed time. We're less than a minute away now from reacquiring Apollo 16 now its 62 -- sixty second revolution. We show a little more 13 minutes away now for time of lunar module jettison and this will be coming up on this frontside pass, and the command and service module separation is scheduled some 5 minutes later. This is at 195 hours 15 minutes ground elapsed time. It will be two foot per second retrograde burn. We'll stand by and await conversation with the crew of Apollo 16. At 194 hours 57 minutes continuing to monitor, this is Apollo Control, Houston.

PAO We're now receiving data from the spacecraft.

CAPCOM Orion, Houston.

SC Hello, Houston.

CAPCOM Roger. Where are you on the checklist, now?

SC Houston, 16.

CAPCOM Hello 16, this is Houston. Go ahead.

SC Okay, Hank. We're closed out the tunnel bed. The tunnel is being vented now. One question on that lab out is a pretty big bird. You got enough RCS -- I didn't have cross speed. You got enough RCS?

CAPCOM Standby.

CAPCOM Apollo 16, Houston. Would you verify that you left Orion in auto and not attitude hold?

SC Okay, I went to AT Hold, over.

CAPCOM Roger, copy and hold.

SC Hank, we had everything stretched out there. I've had so many erasures on this page and it just got -- nu to that hold.

CAPCOM Roger, understand.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/24/72 2:45 CST 195:03 GET 728/1

ORION logics check?
CAPCOM Roger proceed with logic check and we're trying to get a go/no go on the jet right now.
ORION Okay, we are going be tight with the logics check
CAPCOM Okay, the logics are both on, Delta power on.
ORION (garble).
CAPCOM Roger, you're go for power on.
ORION Okay.
CAPCOM Apollo 16, Houston, we're go for LM jet.
PAO This is Apollo Control, Houston 195 hours 9 minutes ground elapsed time. Standing by now for word on LM jettison.
CAPCOM Apollo 16, you have a go for LM jet.
ORION Roger, we have a go for LM jet. Try to make it.
PAO That's Ken Mattingly responding aboard Casper.
CAPCOM 16, make sure your suit and integrity checks are okay before you do it.
CASPER Okay, Houston, we're going to be about 45 -- running late, is that okay?
CAPCOM That's okay.

END OF TAPE

SC Jets complete.
CAPCOM Roger, copy. Jet complete.
PAO CASPER has now separated from Orion.
The jettison complete. Standing by now for CSM sep.
SC The LM doesn't seem to be holding
attitude.
CAPCOM Rog, understand doesn't seem to be hold-
ing attitude?
SC That affirmative. Okay and Hank, would
you run my RCS select procedures again? I'm not sure I got
the right combination for you.
CAPCOM Okay Ken, we don't have high bit rate.
The way you can do this is --
SC What should we be kicking?
CAPCOM Okay we just want the single jet
authority in PRO. That's the only thing we have to worry
about the boom. And you're going to have to burn out the --
your Y as if you were trimming the plain change burn, using
that same ROLL and PRO 90 degrees to get rid of your Y.
SC If I go into attitude I get all -- get
rid of the Y anyhow can't I?
CAPCOM Say again Ken.
SC If I get over to this zero YAW I can get
rid of this Y isn't that correct?

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/24/72 CST 2:56 GET 195:14 730/1

CAPCOM Standby.
CAPCOM Okay, Ken, and of course, you can't trim plus Z. That's just like it is if you're trimming off TEI. You are going to have roll 90, and trim out your plus C.
SC Okay.
CAPCOM Roge.
CAPCOM You got the stick.
SC Roger.
PAO Mattingly working with his onboard computer now and program 41, the FCS program.
SC Transfer give us, OMNI, Charlie.
SC You've got OMNI, Charlie.
SC Roger, (garble).
PAO Very noisy data at this time.
CAPCOM Apollo 16, Houston. Give us your best OMNI.
SC Zero BRAVO.
CAPCOM Roger. That sounds pretty good, Charlie.
SC The residuals are 95 and some we quit burning were plus .2 plus .2 and minus .1. I'll give you the angles. Down 20 270.08 plus 01174 plus 00194.
CAPCOM Roger, copy, Ken, and we have a boom jettison attitude for you.

END OF TAPE

SC Okay, could you say what boom jettison attitude is, Hank.

CAPCOM Roger, 140 357 000 and the jet time is - we've selected as 195:35 but the time is good from 25 to 45.

SC Roger.

PAO The boom referred to is a mass spectrometer boom approximately 25 feet in length.

CAPCOM Attitude are plus 6 345 YAW.

SC Hey, Houston, 16 do they have control of the LM?

CAPCOM Doesn't appear that we have, Charlie.

That was 357.

SC Okay, 357 140 357 000 for boom jet.

CAPCOM That's affirmative.

PAO Preliminary data here would indicate that the lunar module is tumbling at this time. We're at 195 hours 21 minutes ground elapsed time.

CAPCOM For that - those angles I gave you.

SC Okay, say again the high gain numbers, again.

CAPCOM Roger, plus 6 for PITCH YAW 345 manual and wide.

SC Okay, Houston tell me what you think went wrong on that LM jet.

CAPCOM Stand by, we're still trying to sike it out.

SC Houston, Orion didn't look like she fired any jets when we separated at all.

CAPCOM Roger, copy no jet fires. And we didn't see any on the telemetry data we had down here either.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/24/72 195:24GET 3:06CST MC-732/1

YOUNG That Orion was a mighty good spacecraft. Real beautiful flying machine. Had a real great lunar base too. We'll miss her.

PAO Apollo Control Houston. That was John Young bidding farewell to the Lunar Module Orion.

DUKE When you had data there, Hank, on Orion, how did the RCS systems look?

CAPCOM They looked good, Charlie.

CAPCOM Apollo 16, Houston. If possible, we would like to have somebody watch when you adjust snap boom, see if they can see it going.

YOUNG Okay.

YOUNG Hank, would you give me the jettison time again, please.

CAPCOM Roger, we have given you time of 195:35, Ken, but anywhere between 25 and 45 is good.

MATTINGLY Okay, that goes for 25 to 45.

CAPCOM This attitude should put the CSM out in front of everything -- the boom and the LM.

END OF TAPE

CAPCOM Apollo 16, Houston, could you bring up the high gain?
SC Okay.
PAO This is Apollo Control, Houston, the loss of that --
CAPCOM For your information, that boom jet velocity is somewhere in the neighborhood of 7 feet per second.
SC Okay.
CAPCOM REACQ and NARROW on the high gain, please.
SC Okay.
PAO Apollo Control, Houston. The loss of attitude control on Lunar Module Orion precludes the possibility of a targeted burn. A decision is still pending, whether a burn attempt should be made. Data makes it questionable as to whether or not it is possible, in fact. We're at 195 hours 34 minutes ground elapsed time. This is Apollo Control Houston.
SC Okay, we're about to jettison the boom.
CAPCOM Roger.
SC Blew clear.
CAPCOM I understand the boom blew clear. Is that correct?
SC That's affirmative. That's about as stable as you can get. That thing isn't tumbling, rolling, doing a thing.
CAPCOM Hey, it's great to know one thing works!
PAO Apollo Control, Houston. Ken Mattingly reporting the mass spectrometer boom has been jettisoned. We're at 195 hours 36 minutes ground elapsed time.
CAPCOM Apollo 16, if you can get to it, we'd like to terminate the BAT A charge.
SC That's terminated, Hank.
CAPCOM Thank you.
CAPCOM Apollo 16, Houston. We've got a flight plan update, we would like to get up to you if we could get one of you to doff a suit right quick. It would be easier to copy.
SC I'll just copy right now, Hank. Doffin' suits is nothing easy for anybody.

END OF TAPE

SC I'll just copy you right now, Hank.
Doffing suits is nothing easy for anybody.

SC Hank, can we go ahead and go to the
satellite launch attitude?

CAPCOM That's affirmative.

SC Okay, and is there is any reason not to
add couples on now?

CAPCOM That's negative. You can go couple now,
Ken.

SC Okay, I have.

CAPCOM Okay, Ken, and the first change we want
to get to start at page 328.

SC Go ahead.

CAPCOM Roger, now 218 hours there is now 196:10.
And you have a -

SC Yes sir.

CAPCOM - cosa delta from now on to subtract into
21 hours and 50 minutes and this will apply through TEI.

SC Okay, that's a minus 21:50 through TEI,
and I think I have marked all my pages with that amount already.

CAPCOM Alrighty, then the first change is at
196:21 delete the verb 48, and P20 and the set outlet just
delete that group of data.

SC Okay.

CAPCOM At 196:35 add in ABLE all jets except
A1, A2, B1 bravo 2, delta 1, delta 2.

SC Hank, is that the SIM jet configuration.

CAPCOM Negative, this gives you couple jets and
all axis but roll and we want quad C providing roll control.
Now this is so FIDO can get good tracking for TEI and this
is being coordinated with OSO and is acceptable to the map-
ping camera pads.

SC Okay, why don't you - you read me a list
of jets not to have on is that right.

CAPCOM That's affirmative. Everything on except
alfa 1 and alfa 2.

SC Okay now - keep going.

CAPCOM Bravo 1, Bravo 2 and delta 1 and delta 2.
This just gives you beady roll off.

SC Yeah, let logic pressure go back to -
off center. Bottom positions okay too. That's it.

CAPCOM Do you have that, Ken?

SC Okay, at 35 that's 196:35 you've got in
ABLE everything except these and the exceptions are A1, 2
B1, B2, D1 and D2.

CAPCOM That's correct. And following that P20
option 5 plus X forward sim attitude to be there at 196:41.
NOUN 79 .5 degree deadband. High gains PITCH 10 YAW 0 for
AOS act.

SC Okay, Hank does that mean that the - that the jettison attitude is going to be very close to the P20 attitude?

CAPCOM Should be about a 6 minute maneuver.

SC Was there any reason for not doing all that stuff earlier?

CAPCOM What are you referring to, Ken?

SC Well, you just give me a maneuver here to be done after I enable the engines at 35 and to be there by 41. And, we keep running into these things where you roll out and start the camera and if that's the case I'd like to start the maneuver a little earlier. I'd like to have some padding in there.

CAPCOM Okay, I guess I don't see anything magic about the time when you do that. If you want to back it up that's fine.

SC Okay, we'll do so. Thank you very much. And we'll be there in any event by 41.

CAPCOM Roger, and at 42 and I don't see why you can't do this one earlier either. Mapping camera laser altimeter cover open, mapping camera extend.

SC Okay at ...

END OF TAPE

SC Okay, yes, we'll get the mapping camera covers open and the camera extended.

CAPCOM At 196:47, laser altimeter on, image motion on, mapping camera on T start, image motion increased, barber pole plus 1. And your T start is 196:49:43.

SC Okay, T start is 196:49:43. And we'll have the laser on, and the IMC on, and we'll go to barber pole plus 1.

CAPCOM That's affirmative. And at 196:52 orbital science visual King, that's Victor 4, it's on charts Delta 4 and Delta 5, window 5, and note that the visual runs until 197:02.

SC Okay, we'll cover King, window 5 when we go by it.

CAPCOM Roger, and at 196:56, acquire mix MSFN manual wide, pitch 10, yaw 0.

SJ Okay, we'll acquire MSFN, pitch 10, yaw 0, and manual on wide.

CAPCOM Okay, Ken, and we'll save the rest of this 'til the next rev. You can go ahead and start dopping and get ready for the satellite jet.

SC Okay. Thank you.

SC Okay, Houston, going off com for don of suits.

CAPCOM Roger, copy.

SC Hank, before tomorrow, we'd like -- well right away, would you guys ask the suit people what we could do to get some lubrication into these wrist rings? John and mine are real tight, and we're finding them very difficult to lock. Over.

CAPCOM Okay, Charlie, I'll do that.

PAO This is Apollo Control, Houston, 195 hours 52 minutes ground elapsed time. We're a little more than 20 minutes away now from time of a subsatellite launch.

PAO This is Apollo Control, Houston, at 195 hours 59 minutes, ground elapsed time. In the Mission Control Center, it has been completely -- we have completely ruled out the possibility of any further plans for Lunar Module Orion. No further burn attempt will be made. We show 11 minutes away from loss of signal with Casper. We'll stand by and continue to monitor the conversations as they develop. At 196 hours ground elapsed time, this is Apollo Control, Houston.

SC Houston, 16.

CAPCOM Go ahead.

SC Hank, I'm looking ahead here trying to find out where we have a pan camera turn ON, and I don't see it, maybe I missed it somewhere. Can you -- I thought you said

SC something about we're suppose to have both a mapping camera and a pan camera pass.

CAPCOM Roger, Ken, we get it on it just after AOS at 197:03. We got some more changes for you for that rev, we thought we'd read 'em up the first part of that rev, rather than clutter you up right now.

SC Why don't you clutter me up right now with those things, please.

CAPCOM You want 'em now? Okay, 197:03 --

SC Yes please.

CAPCOM --

SC Go ahead.

CAPCOM Okay, 197:03 image motion increase barber pole ON, pan camera standby, stereo, power. 197:05 configure camera for orbital science. CM5/EL/250/CEX innervelometer. That's F8 1/250th infinity. You'll be taking 128 frames, magazine Romeo Romeo. 197:14 PC --

SC Okay, what's that going to be a target of, Hank?

CAPCOM Okay, we're going to pick up that long run you had that started down at Faucault and went -- and went up to La Salle and Alpetragius and stopped. And then you picked up the one down at Bulliadus -- Bulliadus is too far South, so what we're going to do is we're going to start at Fogal, make a jog at Alpetragius and go all the way to the Helmet on past Kascende. And we're about up on LOS now, I'll tell you more about that at AOS.

SC Okay, Hank, thank you. (garble).

PAO This is Apollo Control, Houston at 196 hours 11 minutes ground elapsed time. We've just had loss of signal with Apollo 16 now on it's 62nd revolution around the Moon. Meanwhile in the Mission Control Center, we're in the process of a change of shift. Pete Franks' orange team of flight controllers coming aboard now. The flight director for the shift departing, Phil Shaffer. We're at 196 hours 11 minutes ground elapsed time, and this is Apollo Control, Houston.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/24/72 CST 16:07 GET 196:25 MC736/1

PAO This is Apollo control. There will be a change of shift news briefing in the MSC news center briefing room. That briefing is scheduled to occur in about 23 minutes at about 4:30 central standard time and again that will be in the news center briefing room at the Manned Spacecraft Center. We're about 30 minutes, now, from reacquiring the CSM and when we next hear from the crew the spacecraft will be in it's 63rd revolution of the Moon. At 196 hours 26 minutes this is Apollo control.

END OF TAPE

PAO This is Apollo Control at 197 hours 10 minutes. During the change of shift briefing we reacquired Apollo 16. The Spacecraft now in it's 63rd revolution of the Moon. We expect this to be a relatively quiet front side pass. Among the things that we'll be reading up for the crew, will be the numbers that they will use, these will be preliminary numbers, for the transearth injection maneuver. Which is to occur on the 65th revolution at about 200 hours 33 minutes, ground elapsed time. Ken Mattingly is presently operating the cameras getting some pictures from the command module and also we'll have the pan camera operating during a portion of this front side pass. We have accumulated a small amount of taped conversation we'll replay that for you at this time and then continue to stand by live.

CAPCOM Casper, Houston, how do you read?

CAPCOM Casper, how do you read, Houston.

SC Hello there.

CAPCOM How you doing?

SC Okay, it looks like we got a good lock

now.

CAPCOM Okay. And Ken, would you verify that you copied the flight plan change, it's at 197:03 and 197:05, and it was given just prior to LOS.

SC Well I don't know if I copied the ones that you think you gave. I copied some said, IMC to barber pole, and pan camera stand by stereo power, and then something got started about orbital science photos and that was all I got.

CAPCOM Okay, the first one there that you just read back was at 197:03 and at 197:05 we ask configure camera for orbital science, command module 5/EL/250/CEX Intervalometer, alright this is F8 1/250 infinity. 128 frames magazine Romeo Romeo. Stand by one I'll get you that.

SC I don't know whether I had time to take my suit off or what.

CAPCOM Okay, Ken that target position your going to add are Pogo, and that goes all the way up through Cinder Cone there, actually you're changing over at Alpetragius little jog and then on up past the Cinder cone and you were originally scheduled to look at Bullialdus and we're going to have to delete that because your track is to far to the north now, we're going to bring your grand track from the Cinder cone right on up through Helmet, and Gassendi and on up to Mersenius Rille. And D 11, 12 and 13.

SC Okay, you want to take one continuous strip.

CAPCOM That's affirmative.

SC -- continous strip from Vogel, to Alpe-tragius to the Cinder cone to the Helmet to Gassendi to Mersenius Rille.

CAPCOM Roger. Except there will be that little jog at Alpetragius over to the right there and then on up through center cone and then straight on up through Helmet. Then Gassendi and on up to the rille.

SC Yeah, I understand that. I'm going to have to have some help on F-stops and I guess I'd rather have you call them out to me rather than have me try to write down and jot them on the map and all that jazz.

CAPCOM Okay, we'll do that.

SC Okay, thank you. And can you give me a time for the passage of Vogel?

CAPCOM Can you hang on a minute. Okay, it looks like 197:29 is the Volgel. And you'll have continuous pass from that point on.

SC Okay, thank you.

CAPCOM Okay, and I have a couple of lunar updates at 197:13 and 15.

SC Go ahead.

CAPCOM Okay, 197:14 it's pan camera operate, T-start 197 14 18.

SC Okay, 197:18 for the pan camera to be running. Will get it.

CAPCOM Roger. And right now you're up to that point where should go image motion increase and pan camera stand by and all that stuff at 197:03.

SC Okay.

CAPCOM Okay, and at 197:15 we want image motion increase.

SC Stand by please.

CAPCOM Okay, standing by.

SC Okay, Don, go ahead.

CAPCOM Okay, at 197:15, we want image motion increase, barber pole plus 3 steps/ON.

SC Okay, barber pole plus 3 at 15.

CAPCOM Affirmative.

SC Okay, is that all for about 10 minutes, please?

CAPCOM That's affirmative.

SC Okay.

SC Houston, 16

CAPCOM Go ahead 16

SC Okay, I think looking back at the procedures during the back side pass I think I've figured out what's wrong with the LM, but I'm not really sure.

CAPCOM Okay, go ahead.

SC Okay, with the changes from yesterday, that were not updated this morning looks like to me on pages 16 and 17 in the Time Line Book we came out of there with now AC power. Both inverter breakers are open.

CAPCOM Roger, understand. Due to the changes yesterday that were not updated today on pages 16 and 17 in the Time Line Book you came out without AC power.

SC That's apparently what happened and I think that the ATT PGNCS needs AC to fire the jets but I'm not really -- to get the control voltage, but I'm not really positive.

CAPCOM Their saying here Charlie, that AC is not required to fire the jets.

SC Okay, then that didn't -- hmmm, I don't know what happened then.

CAPCOM Roger. Don't worry about it, Charlie, we're not.

SC Okay, fine it's just disappointing. Except for that one switch I left everything just like you wanted it.

CAPCOM Roger. Again Casper as a reminder you should now be about through configuring the camera for orbital science and we're about 2 and 1/2 minutes away from the pan camera operation.

CAPCOM Casper we've got a REFSMMAT for you anytime you can handle the computer.

SC Okay, you got computer.

CAPCOM Right.

SC Okay, Houston, you have the computer.

CAPCOM Yeah, we got it.

PAO This is Apollo Control, that completes our tape playback we'll continue now to stand by live. Although we haven't gotten confirmation from the crew our telemetry data shows that the subsatellite has been ejected, from the CSM, from the service module, the SIM bay. And we expect that we will be getting a confirmation from the crew on that also, however at the present time they are quite busy with the camera on board. And we've been keeping the amount of conversation and the amount of request we've been making on the uplink to a minimum.

END OF TAPE

CAPCOM And, Casper, switch to high gain auto.
CAPCOM 16, Houston. I've got some SPS cue card changes and have a request on secondary propellant fuel pressure switches open. If somebody can copy.
CASPER Could you wait on that SPS cue card stuff until I get through the photo strip time.
CAPCOM Roger.
CASPER Will it be too crowded for that.
CAPCOM Negative, I don't think so.
CASPER Say, again, Don.
CAPCOM We'll hold off. Go ahead with your strip.
CAPCOM Looks like we are a minute from (garbled)
CASPER Okay. I'm all set, thank you. And I'm starting with an F8 and 1 2/50 and I'll wait for you to tell me when to change settings.
CAPCOM Roger, will do.
CASPER Don, one of the things I just noticed in the passing Alphonsus is the dark halo craters and each of those has a little amount of light material inside of the crater itself just like all the rest of these craters around here. So maybe a dark halo is really an early stage in development.
CAPCOM Roger, we copy.
CAPCOM Here in a couple of minutes, Ken, we'll have you've go to F 5.6. I'll call you in time.
CASPER Thank you.
CAPCOM Okay, in about 15 seconds you should be north of Bullialdus and we'll have you go to F 5.6 at that point.
CASPER Hey, right now I'm just passing Lassell looking straight down.
CAPCOM Okay, Ken, go to 5.6 as you get up a beam of Bullialdus.
CASPER Okay, at B Bullialdus I'll go to 5.6.
CAPCOM Roger.
CAPCOM Okay, Ken, in about a minute or so we'll be up by Helmet and at that time we'll want to change the shutter to 1 1/25.
CASPER Okay.
CAPCOM Okay, Ken, looks good on 1 1/25 on the shutter and you should be coming up Helmet pretty soon now.
PAO This is Apollo Control at 197 hours 41 minutes. Our return to Earth officer is in the process of computing a preliminary set of numbers for the transearth injection maneuver. That maneuver will start Apollo 16 on it's way back to Earth is scheduled to occur at 200 hours 33 minutes 20 seconds ground elapsed time. And the burn will be performed with the spacecraft service propulsion system engine. It

PAO will be about a 2 minute 50 second maneuver. And with the completion of that burn a splashdown time will be set at 266 hours 2 minutes 7 seconds. That time is subject to change a little bit but the time of entry interface will be quite fixed once the transearth injection maneuver has been performed. We also have some times for acquisition of signal with and without the transearth injection maneuver. If the burn is performed as planned, the acquisition of signal time as Apollo 16 comes around from behind the Moon after performing the burn will be 200 hours 43 minutes 10 seconds. If for some reason the burn is not performed as scheduled on the 65 revolution, the acquisition of signal time will be 200 hours 52 minutes 50 seconds. Looking a little farther down the flight plan, the time now for midcourse correction number 5 is 217 hours 34 minutes. And the time for the CSM EVA is 221 hours 5 minutes. Correction on that the - yes, that would be hatch open 221 hours 5 minutes for hatch open, and hatch closed at 222 hours 15 minutes. In central standard time that would compute to 4:47 pm central standard time the hatch open and 5:57 pm central standard time for the hatch closed. And again the splashdown time that we are looking toward is 266 hours 2 minutes 7 seconds. We expect that that number will probably be updated somewhat following the transearth injection maneuver. Apollo 16 at the present time is in an orbit with a high point or apocynthion of 66.5 nautical miles and a low point above the lunar surface of 52.4 nautical miles.

END OF TAPE

PAO This is Apollo control. We would like to point out that these numbers that were just passed along for such events as TEI, the midcourse correction, the transearth EVA and splashdown all do not take into account the fact that we are expecting to do a clock update. That clock update will move the clock ahead about 21 hours 50 minutes. That 21 hours 50 minutes will have to be added to the times that we have given to the GET times that we have given. In order to keep them in sync with the time we'll be using in mission control once the GET update has been done. We still haven't settled precisely on when that update will be made. The primary purpose for it is to bring the clocks into synchronization with the flight plan. At this point there are two things we can do. We can either go through the flight plan as we have been doing up to now and changing all of the times that are in the flight plan to make them agree with the clock or, and this is a more simple procedure. We can simply change the clock to make it agree with the times that are already in the flight plan. This eliminates a great deal of changes that have to be made to the flight plan and will be done at a convenient point. However, just when that point will be reached we haven't decided on yet. It will be sometime after the transearth injection maneuver. The central standard times, of course, are not affected and they will remain the same for the hatch open hatch close again that central standard time for the transearth EVA hatch open is 4:47 p.m. central standard time hatch close 5:57 p.m. central standard time. The playing that we do with the clocks here in the control center and on the spacecraft will not affect those central standard times.

CAPCOM Okay, Ken we show pan camera T stop now.

SC Okay, and that's in stand by. I completed the photo strip. I have a 160 frames on magazine RR and magazine victor I finished it off with and it now has 160 frames showing.

CAPCOM Roger, understand a 160 frames on RR and on victor. We'll also go mapping camera off now.

SC It's off.

CAPCOM Okay, we'll wait a few more seconds, here 30 seconds total then we can go mapping camera stand by. Okay, and you can go pan camera off, now. And you can go laser altimeter off.

SC The lasers off the pan powers off and I'm going to stand by in the mapper.

CAPCOM Roger.

SC And the image motion is off.

CAPCOM Alrighty. Okay, and we want to do mapping camera retract.

SC Mapping cameras retracting.

CAPCOM Okay.
SC Okay, Don you want to talk about that cue card change or whatever it was you were getting ready to do awhile back.
CAPCOM Roger, and verify that you've got mapping camera laser altimeter cover close.
SC No sir, I haven't just now got the camera in.
CAPCOM Okay, then we want mapping camera laser altimeter cover close and enable all jets.
SC Okay, we got the cover closed and the jets are configure.
CAPCOM Okay, we need to go to block on the computer. And Ken, looks like the circ flag has not been set. I'm ...

END OF TAPE

CAPCOM And, Ken, it looks like that circ has not been set. I'm sorry, it's set, it needs to be reset.
SC Give me the numbers verb 45?
CAPCOM Standby there.
CAPCOM 145 Ken.
CAPCOM Okay, Ken, and we've got one note on the Service Module RCS system, I got a TEI pad, couple more changes to the flight plan, and a SPS cue card change for you, and you can pack 'em any order you want.

SC Okay, let's start with your RCS notes, and then following that, let's take the flight plan, -- I think -- let's take the RCS, the cue card, the flight plan, and finally the pads.

CAPCOM Okay. The RCS note is we want the Service Module RCS secondary propellant pressure switches door OPEN. And that's to prevent the primary fuel tank depletion during TEI.

SC Roger, you copy.

CAPCOM Roger, Ken, I copy, Gerry and I had started reading there on the RCS note, did you read that?

SC No sir, I hadn't (garble)

CAPCOM Okay, I'll try it again here. The Service Module RCS secondary propellant fuel pressure switches 4 OPEN. And the purpose for that, is to prevent primary tank fuel tank depletions during TEI.

SC Do that right now?

CAPCOM Standby one. That's affirm, you want to go ahead and do it now.

SC Four OPEN.

CAPCOM Okay, now on the SPS cue card. Let me know when you're ready to copy.

SC Okay, Don, go ahead. And why don't you give me an outline of what it is first, so I have some idea and what to do, and then I'll work on the card. You go back through it in detail.

CAPCOM Okay, first of all, about a third of the way down the page we've got a note on the pugs operation for TEI; and we've got a couple or three words to add down about nine lines from the bottom on the gimbal trim and verify manual thrust vector control, and we're going to say there ACCEPT yaw. And 7 lines from the bottom we're going to have you open the pitch 2 and yaw 2 battery B circuit breakers to keep the secondary system from getting or sensing an overcurrent and shutting itself down. And on the back of the card, we're going to reclose those 2 circuit breakers after the Delta V thrust stop.

SC Okay, is there some reason you think that we need that added protection this time?

CAPCOM I guess it's just a feeling that if you get into TEI, and you lose the primary system, and you're on the secondary system, you don't want the secondary system to sense an overcurrent and shutdown. We're going to pull these circuit breakers to make sure that that control system continues to function.

SC Okay, that's always the case. I just wondered if there was some reason that you were suspicious that might be more appropriate thing to say this time.

CAPCOM Negative. We don't have any evidence that says that's like it happened or anymore likely to have happened.

SC All right. Is that the -- that's the context of the changes?

CAPCOM That's affirmative.

SC Okay, now let's take it from the top.

CAPCOM Okay, about a third of the way down the page then, we want to add targ mode OX, oxidizer flow valve NORMAL, secondary. And in a comment we want to add -- Do not

SC -- is there something different about this than what we've done here for all of the other burns?

CAPCOM I think just the pug mode OX is the only change.

SC Okay, you want to go pug mode to OX, you want to leave the oxidizer flow valve in secondary, and the position of the valve in NORMAL -- is that correct?

CAPCOM That's affirmative. And we do not want to move the oxidizer flow valve during the burn.

SC Okay.

CAPCOM Okay, then 9 lines from the bottom where it says "set GPI trim, verify MTVC," we want to add the words ACCEPT yaw.

SC Roger.

CAPCOM Okay, and 7 lines from the bottom. We'd like to add circuit breakers pitch 2 battery B OPEN, and yaw 2 battery B OPEN.

SC Okay.

CAPCOM Okay, and on the back of the page after the "Delta V thrust 2 OFF," we want to close those circuit breakers. That's pitch 2 battery B CLOSED and yaw 2 battery B CLOSED.

SC Okay.

CAPCOM Okay, that does it for the cue card.

(Garble)

END OF TAPE

SC All right, give me the flight plan if you will, please.

CAPCOM Okay, at 198:40 in the flight plan.

SC All right.

CAPCOM Okay, we want to add a waste water dump to 10 percent.

SC Okay, we'd have gotten that down further, but we just couldn't get it all done last night.

CAPCOM Okay, and that's somewhere between the P52 and AOS anywhere you want to stick it.

SC Okay.

CAPCOM Okay, and at 199:45 - at 199:45 we want to add -

SC Don, you gave me that at 199:40 didn't you?

CAPCOM Negative that -

SC You mean that waste water dump at 199:40 or 45.

CAPCOM Negative. It was 198:40 on the waste water dump.

SC Okay, that makes more sense thank you.

CAPCOM And at 199:45 -

SC All right go ahead.

CAPCOM At 199:45 we want to add load EMB 509.

SC Okay, load 509 at 199:40.

CAPCOM Okay, that 199:45 and now I've got the preliminary TEI 64.

SC Go ahead, cver.

CAPCOM Okay preliminary TEI 64 SPS G&N 38332 plus 061 plus 095 200 332044 NOUN 81s plus 32656 plus 08080 minus 02151 180 000 000. HA is not applicable H sub P plus 00217 33710 242 33517 sextant star 231837 375 boresight star is not applicable. NOUN 61s minus 0072 minus 15604 10494 36277 265 4912 Set star is serious and rigel 118 311 007 pollage 2 jet 17 seconds use quads A alfa and charlie. Under other number 1 pad based on TEI REFSMMAT. Number 2 sextant star not available until 200 hours GET and we do not have a single bank burn time for the preliminary pad we'll get you one for the final pad. And we're about a minute from LOS, now you can try read back if you want.

SC Okay pre TEI 64 SPS G&N 38 -

CAPCOM 3833 -

SC 38332 plus 061 plus 095 23320.44 plus 32656 plus 08080 minus 02151 180 000 000 plus 21.7 plus 33710 10 minutes 42 seconds 3351.7 sextant star 23 183.7 37 1/2 latitude minus 7.2 minus 156.04 10494 36277 -

PAO This is Apollo control. We lost radio contact with Apollo 16 while John Young was in the process of reading back those numbers. The numbers that he was reading back to us are the preliminary numbers that will be

PAO used for the transearth injection maneuver. That maneuver occurs at a ground elapsed time of 200 hours 33 minutes 21 seconds. And, it will be performed using the spacecraft service propulsion system engine the primary guidance and navigation system. It comes at the very end of the 64th revolution while the spacecraft is behind the Moon. We'll get our first report on the outcome of the maneuver as the spacecraft comes into acquisition on the 65th revolution of the Moon. The total velocity change is predicted at this point to be 3 371 feet per second and that will be achieved by burning the service propulsion system engine for 2 minutes 42 seconds. With that burn performed nominally we would predict a time of entry interface of 265 hours 49 minutes 12 seconds leading us to that splashdown time of 266 hours 2 minutes 7 seconds. The amount of time the spacecraft spends on the shoots after entry interface seems to be a little bit more variable than the time of entry interface. But, those times should not change a great deal given a nominal SPS transearth injection maneuver. We'll be re-acquiring Apollo 16 in 42 minutes as the spacecraft went around the corner of the Moon we were showing an orbit of 66.6 nautical miles by 52.6. At 198 hours 11 minutes this is Apollo control, Houston.

END OF TAPE

PAO This is Apollo Control at 198 hours 54 minutes. And we have just reacquired Apollo 16 now in it's 64th revolution of the Moon, this will be the last complete orbit of the Moon that the Apollo 16 will make. At the end of the 64th revolution, the crew will burn the service propulsion system engine for 2 minutes and 42 seconds to start them on their way back to Earth for a 65 hour 29 minute flight return to Earth. During this revolution while on the frontside of the Moon in radio contact, we'll be passing up the final set of numbers that the crew will put into their onboard computer for that spacecraft's service propulsion system burn. And we'll be getting final looks at all of the CSM systems prior to committing to transearth injection.

CAPCOM 16, Houston, how do you read?

SC Loud and clear, Pete, how are you?

CAPCOM Loud and clear.

SC Okay, Houston, the gyro torquing angles on the B52 option three will start (garble) minus 032 plus 0001 plus 00 -- burp -- excuse me -- plus 034. And that was at a GET of 198:24:35. And those angles were so small they weren't torqued because we went into option one.

CAPCOM Roger.

CAPCOM And 16, I've got a map update, rev 65, at about 200 hours 30 minutes in the flight plan -- TEI.

SC Okay.

CAPCOM Okay, it's around 65 instead of 76, and the numbers are 200 07 27 20031 33 with TEI 200 43 09 without TEI 200 52 48.

SC Okay, 200 07 27 31 33 43 09 and 52 48.

CAPCOM That's affirmative.

SC (laughter) I would susepct can probably throw this one back in that -- back to the -- there -- thank you.

CAPCOM And, Ken, you're on air ground.

SC Thank you.

END OF TAPE

CAPCOM Okay, 16, I've got some numbers on the RCS delta-V. I believe there at 200 hours and about 15 minutes in the flight plan now.

SC Okay, go ahead, Don.

CAPCOM Okay, pre TEI you've got 75 feet per second post TEI you've got 111 feet per second.

SC Okay, pre is 75 and post is 111.

CAPCOM That affirmative.

CAPCOM And Ken, have you got a couple of minutes to listen to a few words about servo loop.

SC Okay, go right ahead, Stu.

CAPCOM Okay, that's a real good system you've got on your second loop. We have got the simulator swinging right with the characteristics of your spacecraft, and this is the way it is going to look to you if you have to use it. Prior to ignition the gimbal is going to be oscillating plus or minus about a degree .9 or something like that or in other words 1.8 peak to peak. But once you get thrust on there's a side load on your bell from the LOI burn and this side load acts as a damper since the load is cycling it really doesn't matter which direction the load is it temps out. Under CMC control it will damp out in a few seconds and burn very steady. In SCS auto it damps almost immediately and then is steady throughout the rest of the burn. And rack the mand however since your continually pulseing it with an input it continue to oscillate pretty much as this same magnetude or amplitude throughout the burn. However, as far as you controlling it, it really doesn't matter however sitting in the simulator we don't get the real live shake affects that your going to get. The spacecraft is going to shake and shutter, however, your attitude will remain virtually unchanged. And I guess the only advise that I could say would be that if you down load, if you could go to SCS auto you would save those excessive clutch currents that you get under rate command with this continual oscillation. And I guess I'll stop there if you've got any questions.

SC No, that's good information, Stu. I'm glad to hear that. Do you - you got any cute tricks in the back of your mind of how you can down load from rate command and then go back to auto without getting a transient due to the mistrims?

CAPCOM No, now I tried it purposely having at least say a degree mistrim and I would switch, and you'll get the transient but the bell will steady out. Now, I think going ahead and flying it in rate command is acceptable; however, you are getting the bell oscillating and you are pulling the currents through there.

SC Okay, I get the - sounds like if you could damp the rates damp the oscillations quickly by getting it

SC into rate command - I mean the auto and then use the old front wheel procedure to change the pointing accuracy if you aren't pointing in the right direction.

CAPCOM Yeah, you don't have much control with that front wheel in the auto. I think probably I would take it in rate command, go back to my attitude recycle my B mags uncage them again at the attitude I wanted and then accept the mistrim and the gimbal and let that damp out. I think your going to be hard put to try to guess - guess your thumb-wheel setting. However, let us think about that a little bit and also I'd like to say this has been checked I talked with North American this afternoon this all agrees with the hardware evaluator as far as our characteristics so I think we're pretty close to your spacecraft.

SC Okay, that's outstanding. Sounds like you guys have done a mighty through job. My first choice then would be, I think based on what you said right now just do the natural thing and take the oscillations unless their excessive and just down load in the normal manner and ride it out.

CAPCOM Okay, that sounds - I think that very -

SC First choice I think we'll do the normal thing and burn CMC.

CAPCOM By all mean, yes, CMC is prime or you can down load -

SC Okay.

CAPCOM You can down load, you'll be in rate command and you will have the bell shaking. It'll start to damp a little bit but everytime you hit with an impulse why you'll excite the oscillation again.

SC Okay, thank you very much Stu.

CAPCOM Rog.

PAO This is Apollo control at 199 hours 11 minutes that was Astronaut Steward Roosa who has been running a number of simulations in the simulators here at the Manned Spacecraft Center reproducing the problem that has existed in the thrust vector control in the Apollo 16 backup guidance system. He was going through with Ken Mattingly what the crew on Apollo 16 -

CAPCOM Another thing, Ken, after convincing you that that system is real good, which we believe it is, we'd like to say that I'm assuming that you would do this anyway. That if everything isn't checking out real good primary system wise or anything else you just come around let's take another look at it.

SC Yes sir, if there is any problem with the primary system or anything abnormal come around and talk it over.

CAPCOM Okay, very good.

END OF TAPE

CAPCOM 16, would you verify B mags in rate to
SC Will now. Thank you, Don.
CAPCOM 16, if you'll give us the computer, we'll
uplink at state vector a target load for you.
SC You have it.
CAPCOM Roger, thank you, and go AUTO on the high
gain.

PAO This is Apollo Control. Our spacecraft
communicator for the transearth injection maneuver will be
astronaut Don Peterson. He is accompanied at the CAPCOM con-
sole by astronaut Stu Roosa, who a few moments ago was discuss-
ing with Ken Mattingly from his experience in the simulators
what Mattingly and the crew of Apollo 16 should experience.
If for some reason they had to switch over to the backup gui-
dance system to control this transearth injection maneuver,
with the problem that they have had with the thrust vector con-
trol, how that system would control, and what they should ex-
pect to see and feel. In essence, Roosa's comments, from op-
erating with a similar system in the simulator, were that the
backup system should control very well. But there will be
some oscillations due to the oscillation in one of the two
axis of control of the thrust vector control system which
transmits the commands to the SPS engine bell that gimbal it
from side to side and up and down. In the yaw direction there
are some oscillations in the backup control mode. However,
Roosa found that with a precise sort of a set up that the
Apollo 16 spacecraft has, and what he described as some side-
loads that are characteristic of the way this engine is burn-
ing. It will damp out most of the oscillation shortly after
the engine ignites, and would control properly, and would
control the burn very well. This again, we'd reiterate is a
backup control system from everything that we've seen on the
primary control system is expected to function normally and
give the same excellent account of itself that it has in pre-
vious burns. The advice to Ken Mattingly, in the event that
there is some unforeseen problem with the primary control sys-
tem, is that he would go on around, not perform the burn, let
us take a look at the primary system back on the frontside of
the Moon. See if there would be any way of restoring that,
and if not, the burn would be performed with the backup system
which we would also expect to do a very good job of controlling
the maneuver.

SC Okay, Pete, go ahead.
CAPCOM Okay, TEI 64 SPS G&N 383 32 plus 061 plus
095 200 33 2042 plus 32644 plus 08099 minus 02257 180 000 000
HA is not applicable plus 00 217 33709 242 33 5017 sextant
star 23 1837 375 013 standby one -- down 096 left 31 noun 61
minus 0072 minus 15604 10494 36277 GET 265 49 12 set star
Sirius and Rigel 118 311 00 Ullage --

END OF TAPE

CAPCOM 183 11 007. ullage 2 jetts 17 seconds, use Quads Alfa, and Charlie, other, okay on under comment one pad based on TEI REFSMMAT to sextant star not available until 200 hours GET, single bank burn time 2 minutes 48 seconds, number 4 boresight star not available until 200:2600.

SC Okay, Pete, we copy. TEI SPC G&N 38 332 plus 061 plus 195 200 33 2042 plus 32 644 plus 08 099 minus 02257 180 000 000, NA for HA plus 00 217 33 709 242 33 517 23 1837 375 013 down 096 left 31 minus 0072 minus 15604 10494 36277 265 4912 Sirius and Rigel 118 311 007. 2 jetts 17 seconds use Quads A and C, notes TEI REFSMMAT sextant star available at 200 hours, single bank burn time 2 plus 48, boresight 2 -- sight stars 200:26.

CAPCOM The readbacks correct, 16.

SC Okay, thank you.

PAO This is Apollo Control, those were the final set of numbers that the crew will use for the transearth injection maneuver. And they were virtually unchanged from the preliminary which were read up on the previous revolution, the time of ignition remains the same 200:33 21 seconds, the total velocity change 3,370.9 feet per second and the burn duration is unchanged 2 minutes 42 seconds, and the time of re-entering the Earth's atmosphere also unchanged, 265:49 12 seconds. We have about 45 minutes remaining before we lose radio contact with Apollo 16, on this revolution. When next we reacquire radio contact with the spacecraft they'll be at the start of their 65th revolution and should be on their way back to Earth.

CAPCOM And 16, I've got some block data. TEI 65.

SC Okay, go ahead.

CAPCOM Okay, TEI 65 SPS G&N 38 332 plus 061 plus 095 202 32 31 35, NOUN 81 plus 33373 plus 08690 minus 01834 180 358 001 rest of the pad is NA set stars Sirius and Rigel 118 311 007 2 jetts 17 seconds use Quads Alfa and Charlie.

SC Okay, Pete, we copied TEI 65, SPS G&N 38 332 plus 061 plus 095 0232315 plus 33373 plus 08690 minus 01834 180 358 001 NA rest of the pad, Sirius and Rigel, 118 311 007 2 jetts 17 seconds, Alfa and Charlie. Over.

CAPCOM The readback is correct 16.

SC Hey, Don, could you have someone check on the proper exposure settings for CEX film, for post TEI?

CAPCOM Sure can.

END OF TAPE

CASPER Hey, Don, could you have someone check on the proper exposures setting for a CEX film for a post TEI?

CAPCOM Will do, Kid.

CASPER Thank you, sir.

PAO Apollo 16 at the present time is passing over the Descartes landing site for the final time on this mission. We have about 38 minutes now until we lose radio contact on this revolution.

CAPCOM 16, we've got about 4 more updates to the flight plan anytime you want to copy. At about 200 hours and 43 minutes is the present.

CASPER Okay, go ahead.

CAPCOM Okay, there's a list of items at 200 hours 43 minutes and we want to add to that list: pan camera V over H over ride to high altitude.

CASPER Okay, pan camera V over H to high.

CAPCOM At 200 hours 46 minutes we want to change barber pole plus 3 steps to barber pole plus 2 steps.

CASPER Okay, that's plus 2.

CAPCOM Roger. And at 200 hours and 56 minutes we want a change from gamma ray deploy to read gamma ray deploy to 8 feet and that's 59 seconds.

CASPER Kay. Gamma ray deploy at 8 feet 59 seconds.

CAPCOM Okay. And at 201 08 we'll get maneuver angles to Moon UV attitude are roll 174 PITCH 212 YAW 64 and the high gain antenna angles are PITCH minus 73 and YAW 12.

CASPER Okay 174 212 and 064 for the attitude and high gain minus 73 and 12.

CAPCOM Ah-h, Readback correct and that's all the flight plan update we've got right now.

CASPER Okay, Don, down here where it says pan camera mapping camera film should be expended, I'm go let them things run until you guys tell us you are either tired of taking pictures or something cause we're not going to run out I don't imagine. At least not at this point.

CAPCOM Okay, 16, understand the pan camera will probably run out but the mapping camera may take quite a while.

CASPER Okay. I suspect it's probably to our advantage even though the cutter works good, we probably ought to run it out. That's your call though.

CAPCOM Okay, 16, think that's what we plan to do.

CASPER Okay.

CAPCOM Then, 16, it'll take about 3hours to get rid of that mapping camera film if we run it all the way out.

CASPER Okay. Is that what you want to do or did you just want to go ahead and cut it tomorrow? Makes no difference to us.

CAPCOM We'll let it run out, Ken.

APOLLO 16 MISSION COMMENTARY 4/24/72 CST 19:06 GET 199:24 746/2

CASPER Okay.

CAPCOM 16, can you verify that the subsatellite
deployed on time?

CASPER Yes, sir, sure can.

CAPCOM (garbled)

CASPER How's it doing?

CAPCOM Okay, I just was not able to see it until
the LM electrical power runs out.

CASPER Yes sir, it went on time. Of course it
was in the dark and we couldn't see it to verify it visually,
but -- All indications were that everything was a normal
deployment.

END OF TAPE

SC Yes sir, it went on time. Of course, it was in the dark and we couldn't see it verify it visually. But, all indications were that everything was a normal deployment.

CAPCOM Roger, understand.

SC And you can tell all our friendly G&C's Don, that I don't understand it but in a 100 seconds MS now only shows a .4 change looks like the MS gets better as time goes on.

CAPCOM Roger, understand you think the MS is getting smarter.

PAO That was Ken Mattingly reporting that the subsatellite was launched from its position in the scientific instrument module bay of Apollo 16 on time. The connection between the lunar module batteries and our ability to turn on the subsatellite begin receiving data from it is that the lunar module and the subsatellite operate on the same frequency. The lunar module, of course, is no longer - we're no longer able to command it. It will not be impacted into the lunar surface; however, its communication system is still functioning and it is still putting out radio frequency energy still transmitting and for that reason we're not able to activate the subsatellite begin receiving data from it. This will continue until the lunar module batteries go dead.

SC Houston, is it okay for 16 to go to the burn attitude?

CAPCOM Stand by, one. Okay 16, you can go to burn attitude.

SC Okay, thank you sir.

CAPCOM 16 would you verify limit cycle switch off.

SC No, as a matter of a fact its on right now.

CAPCOM Okay, we'd like to have that switch off, please.

CAPCOM 16, we'd also like you to verify once more, although, we're sure your going to do it this way anyway that your going to leave the optics power switch on during the burn because that will decrease the vulnerability of the glitch occurring.

SC Okay, I didn't realize that it would. We would have left it on but thank you for telling us.

CAPCOM Roger.

PAO This is Apollo control. A few moments ago Ken Mattingly reported the spacecraft was beginning to maneuver to the proper attitude for the transearth injection burn. We expect when they do that we'll momentarily lose lock on with the high gain antenna. In fact, we are hearing a bit of increase in the noise level now and we just had break in the lock. We'll be reacquiring should have a good solid lock up again shortly. In the mean time we'll continue to

PAO have rather noisy communications between the ground and the spacecraft. And communications controller here INCO reports that we should be locking up shortly on an OMNI antenna. And we've just done that. We've got good solid lock on now. As an additional note of interest on the interference problem that we're having with the lunar module transmitter which is as we said on the same frequency as the subsatellite. We're predicting that the LM batteries will die in about 211 hours ground elapsed time give or take an hour and a half. So at about 211 hours we should be able then to command the subsatellite and to begin receiving data from it. Now there is a small possibility that we'll get a lock on the lunar module for a long enough period of time that we can command it to shift frequency so that we no longer have the interference problem. However, as soon as the LM breaks lock it will again revert to the original frequency so this would only be a temporary assist in the problem. And, until 211 hours plus or minus an hour and a half we don't expect to be getting any consistent data from the subsatellite. We're showing now 19 minutes 25 seconds until we loose radio contact with Casper. As the spacecraft goes around the corner behind the Moon it should be in the proper attitude for the burn and flight controllers here will be getting a last look at all the systems and we'll be giving the Apollo 16 crew a go for transearth injection.

END OF TAPE

CAPCOM Okay, 16, I've got those camera settings for after TEI. Can you tell me if you're ready to copy?

SC Go ahead.

CAPCOM Okay, for the first 15 degrees past the terminator, the settings are 5.6 1 over 125 and infinity 15 degrees to 30 degrees it's 5.6 1 over 250 and infinity and past 30 degrees it's 8 1 over 250 and infinity.

SC Okay, thank you, Don. The first 15 degrees is 56 1/125th and from 15 to 30 is 1/250th and from 30 on is an 8 and 1/250th, thank you.

CAPCOM Roger, and just a couple of additional comments here. The B20 attitude is going to differ slightly from what you've got in the flight plan, due to the fact that we're using a different TEI REFSMMAT. It's a very small change and probably not very significant, but we didn't want it to surprise you. And the TEI web is different of course. That's going to give us a slightly different terminator, so we've been advised that you can turn the mapping camera and the pan camera a couple or three minutes early if you like since we got a lot of film.

SC Okay, we'll put those things on as soon as it's practical. And you want to change the noun 78 load or are you just saying that that will give us the difference in the gimbel angle.

CAPCOM The noun 78 load is correct. It'll just give you a slightly different set of gimbal angles.

SC Okay, thank you.

CAPCOM Alright.

SC And the 509 flag is set.

CAPCOM Roger.

CAPCOM And 16, you're go for TEI.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/24/72 199:53GET 19:35CST MC-749/1

CAPCOM
SC
CAPCOM

And 16, you're go for TEI.
16, is goirg for TEI.
Roger.

END OF TAPE

SC Okay, Houston, we have a successful star check.

CAPCOM Roger, understand successful star check.

SC That's affirm.

PAO Ken Mattingly has reported a successful star check is an indication that the spacecraft is in the proper attitude for the transearth injection burn. We're now 4 minutes 22 seconds away from loss of radio contact with Apollo 16. When next we reacquire spacecraft and crew should be on route back to earth. With a good TEI burn we would expect to reacquire Apollo 16 at 200 hours 43 minutes 10 seconds ground elapsed time. If for some reason the burn is not performed on this revolution we would reacquire at 200 hours 52 minutes 50 seconds. The spacecraft weight prior to that 2 minutes 42 second burn of the service propulsion system is predicted to be 38 332 pounds following the burn it will be 27 487 pounds. The difference of 10 845 pounds being in the propellant that'll be consumed in that 2 minute 42 second burn. At the time of the transearth injection maneuver the lunar module will be about 16 miles behind Casper the Command and Service module and about 1 mile above. We're now 3 minutes away from loss of radio contact.

CAPCOM Got 45 seconds to LOS. See you coming home.

SC Roger.

PAO Apollo 16, now behind the Moon out of radio contact 26 minutes away from the 2 minutes 42 second burn that will start them on their way back to earth. About 45 seconds prior to loss of radio contact capcom Don Peterson advised the crew that we were coming up on loss of con - loss of signal and said see you on your way home, and we got a terse roger from John Young at that point. Again, those time of acquisition with a normal transearth injection burn 200 hours 43 minutes 10 seconds without the burn 200 hours 52 minutes 50 seconds. And, when we reacquire Apollo 16 they should be moving rapidly away from the lunar surface from the Apollo 10 mission where we had television of that particular portion of the mission we recall very spectacular view of the lunar surface out the window of the spacecraft. The Moon dropping rapidly away and shrinking rapidly in size. At 200 hours 8 minutes 38 seconds this is Apollo control, Houston.

END OF TAPE

PAO This is Apollo Control. Now 1 minutes 30 seconds from reacquiring Apollo 16. Should the spacecraft for some reason not have burned it's transearth injection maneuver we will be reacquiring in about 11 minutes. This burn with the surface propulsion system engine was to be a 2 minute 42 second burn producing a total change in velocity of some 3371 feet per second, increasing the speed of Casper from 3600 nautical - rather 3600 statute miles an hour to about 5900 statute miles per hour. In the course of this 2 minute 42 second burn the service propulsion system engine would consume some 10 845 pounds of propellant. One of the things that's accomplished with the transearth injection maneuver; and of course the prime objective, starting the spacecraft on it's trajectory back to Earth. Well, also with this maneuver we set the splashdown time. From that point on there are minor corrections to the trajectory primarily to control the entry interface angle which is set at negative 6.51 degrees. Correction, negative 7.37 degrees. And with no problems of weather, and what we would have to change weather - Now we've just gotten the call of acquisition of signal right on time. We should be getting the first words from the crew. We're waiting for the antennas to lock up and communications are still quite noisy.

SC (garbled)

CAPCOM 16, we can't make out the words. We can hear you calling.

SC Roger. (garbled)

CAPCOM Roger.

CAPCOM 16, Houston. Let's try it again.

SC Do you read us now, Don?

CAPCOM Ah, roger, you're a lot better now.

SC Roger. Just thought we'd come up like thunder and that's how we're coming up. Just going away from it like nothing.

CAPCOM Roger.

SC It's better than an P climb, Pete.

CAPCOM Roger, understand.

PAO John Young, and Charlie Duke with the reactions very similar to what we've seen from previous crews as the spacecraft moves out very rapidly from the lunar surface. We're sure that they are all eyes every chance they get looking out the windows and watching the Moon receding rapidly beneath them, growing rapidly smaller. The spacecraft velocity now is 7957 feet per second.

CASPER We're working some mapping stuff. The burn was completed nominal. We'll give you a status report just as soon as we finish.

PAO That was John Young reporting the burn was completely nominal.

APOLLO 16 MISSION COMMENTARY 4/24/72 CST 20:23 GET 200:41 751/2

PAO Apollo 16 already 333 nautical miles above
the Moon.

CASPER Okay, Houston, burn status report follows:
There is no Delta TIG, burn time 242.4. There's no trim. And
the residuals were measured at 184 005 and 351 degrees .210
VGX, 1.2 VGY, .1 VGZ, all pluses minus 19.1 Delta VC

END OF TAPE

SC .1 VGZ all pluses minus 19.1 Delta VC,
SC 3.9 is the oxidizer and 5.2 is the fuel.
CAPCOM Roger.
SC It is really beautiful that baby just hums
right out of there.
CAPCOM That's great, Ken.
SC She really put on the power. It's kind of
refreshing to get a whole 1/2 a G from her.
CAPCOM Roger.
SC The boys are all at the windows taking pic-
tures.
CAPCOM Roger.
SC We got some pictures of Earth rise as we
were climbing out. I'll bet they're really spectacular.
CAPCOM Rog. Hope they come out nice.
SC This sun is really a fascinating satellite.
Boy there's something new and different and you can sure see
a lot of variety view right here. This is almost more spec-
tacular than (garble) when we were coming in here, Houston.
About 4 or 5 days ago, how ever long ago it was.
CAPCOM Roger.
SC I think the general agreement in the cock-
pit is that morale around here just went up a couple 100%.
CAPCOM Rog. Morale looks pretty good here Ken.
PAO Apollo 16 climbing out now to 471 nautical
miles above the Moon and that just updated to 480.
SC Hey, Houston, how do you read on the high
gain?
CAPCOM You're loud and clear now.
SC Okay, I missed your last thing we're switch-
ing over.
CAPCOM Roger.
SC We're now getting a view of on the horizon
and there's Crisium. Way up north there, Charlie.
CAPCOM 16, we need a VERB 58.
SC You want a VERB 58?
CAPCOM That's affirmative.

END OF TAPE

PAO Apollo 16 now 583 nautical miles from the Moon and the velocity is dropping off down to 7 425 feet per second. John Young, so far, has been doing most of the talking reporting that Charlie Duke and Ken Mattingly were at the available windows taking pictures.

SC Really a spectacular view. Really get the curvature.

CAPCOM Tell us about it.

SC Yeah, the old crescent earth coming up there - the earth rise was just beautiful just came up like gangbusters. We were looking right out the window and there you came and right now your a - almost just a crescent earth just a very sliver out there. And I tell you we can hardly wait. I know we've got a couple of things to do before we get there, but we're looking forward to it.

CAPCOM Roger.

SC Houston, another great view that we had right before TEI was your prime earth set. Your crescent was - your the light portion of the earth was pinched into the lunar horizon and went down you ended up looking like a big bull horns up there.

CAPCOM Roger. 16, let's go high gain auto.

SC You have it.

CAPCOM Thank you.

PAO And Apollo 16 just passed through 700 nautical miles.

SC Houston, we now have, looking out the center hatch window the whole - the Moon fills the whole window. I can see from horizon to horizon by just being about 4 inches from the center hatch window. What a spectacular view.

CAPCOM Roger.

SC That's from horizon to horizon along the equator. We are really climbing away from the planet. You can just see it getting smaller by the second.

CAPCOM Really moving out, huh?

SC Yeah, we're doing just like old 97 really moving down the track.

CAPCOM Rog.

SC Almost as fast as John was driving that rover yesterday.

CAPCOM Roger.

SC Pete, out of window 5 I can already see the whole sphere.

CAPCOM Roger.

SC I just can't get these new guys away from the windows.

CAPCOM Roger.

SC That view is just beautiful.

APOLLO 16 MISSION COMMENTARY 4/24/72 CST 20:35 GET 200:53 MC753/2

CAPCOM And 16, we're showing the image motion
on and we'd like you to go off, if it isn't.

SC Okay, that's in work.

SC Don, I'll have to stop the camera and
start it again, is that okay?

CAPCOM We concur 16.

SC Okay, Don, I've got the camera running
again and what barber pole setting did you want on the - on
the speed?

CAPCOM Barber pole plus 2, 16.

SC Okay, you've got it now. Is there any-
thing else we had ought to configuration?

CAPCOM I think not ...

END OF TAPE

SC Okay, you got it now. Is there anything else that we have without a configuration?

CAPCOM I think not, but stand by a minute.

SC You know you can sort of sense -- from where we're looking right now you can sense a swing out in this big arc back toward the Earth. Looking right now at my 12:00 out the hatch window seems like we're almost climbing right away from the center of the Moon. And I can see the whole Mare of Crisium is spread out up to the north and on our ground track, well just north of our ground track you can see Messier A and B craters. Langrenus.

CAPCOM 16 we can go ahead and get the gamma ray deployed to 8 feet, that's 59 seconds.

SC Okay, I'll do that. 8 feet 59 seconds. And this is the one place we can get a good view of Helmboltz that we got on our first pass there.

CAPCOM Roger.

SC Okay, Don, you want those deployed for 59 seconds, is that affirm?

CAPCOM Roger.

SC I guess in SIM bay attitude the only thing we have been able to see so far is Sea of Tsiolkovsky and Charlie said he got it a view of it out his window. So I guess just about now we're able to see the whole Moon. Boy we're really moving away fast.

CAPCOM roger.

SC That's the whole Moon out a window. Back from it about 2 inches.

PAO Apollo 16 is now some 1400 nautical miles from the Moon.

SC Okay, the gamma ray is out.

CAPCOM Roger.

PAO And here in the control center the Flight Dynamics Officer just confirmed John Youngs reports from on board the spacecraft that that burn was almost precisely as planned. With a very small midcourse correction requirement showing at this time.

SC The color is very much the same as it was when we were orbiting it. And that is that no 3 men on any one crew can agree on what the color really is.

CAPCOM Roger.

SC Looks like to me Pete, that the Mare right now just picked up a bluish black cast to them. Charlie, those Maria are brownish black. John says brownish.

CAPCOM Rog. understand a bluish brownish black cast. You guys have invented a new one this time.

SC That's right, we'll get Kens opinion. Stand by. Pete did CST come back with anything on those wrist rings?

CAPCOM Stand by one, Charlie we'll check on it.

SC You know as we move out from the Moon, I

SC think that by looking at the varied structures on the surface that we can see from here, I guess my impression of it is that the Moon may be 4 billion years old plus but it sure had a -- may eventually have stopped growing after the first 500 million or changing dynamically, like the Earth changes, but during that first 500 million years it certainly busy cause it really has a lot of variety down there that we haven't even begun to scratch the surface of the complexities of the story, that's my personal opinion.

CAPCOM Roger. Charlie, on the problems on the rings I guess we don't really have an answer for you. We may get some more in the morning but there's no apparent good good way to do anything about that. We don't have a cleansing agent or a lubricant you can use on them. I guess you'll just have to use more force on it.

SC Okay, fine. But we can get them locked with low force and they pass checks okay, once you get them on.

CAPCOM Roger.

PAO The ring that Charlie Duke was asking about is the glove lock ring, the problem that he described is in getting the gloves locked onto the suit and you heard him say that it does take some force to do it, but once they get it done, and get the gloves locked in place their maintaining a good seal. And the suit is passing suit intergrity check alright. The recommendation from Capcom Don Peterson, was that there is little we can do about cleaning the grit out of those wrist locks they looked into the possibility of perhaps pouring water into them but they felt that that would only turn the dirt that's in there to mud and would really not improve the situation any. So the crew was advised to leave them as they are and apply the necessary force to get them locked. It appears that this will cause no problem. Apollo 16 at the moment is 1766 nautical miles from the Moon continuing to climb out rapidly, although the velocity is dropping off, down now to 60, 245 feet per second. And about 12 hours from now or at 212:53 36 seconds the spacecraft will again cross that mythical line we call the lunar sphere of influence at that point they will be under the dominant effect of Earths' gravity. We'll have our displays switched over from Moon reference to Earth reference and we'll begin seeing apollo 16 accelarting toward Earth.

END OF TAPE

CAPCOM And 16, I've got a couple of flight plan changes for you at 201:30 and 201:35.

SC Okay, wait a second.

CAPCOM Roger.

SC Continue to standby just a second on those.

CAPCOM Sure can. Just call me before you do the burn 49, we've got some attitude changes.

SC Okay, we won't go anywhere.

CAPCOM Okay, 16, the verb 49 at about 201:07 in the flight plan for the UV photography should have been started oh, about 10 minutes ago.

SC Okay, we'll go to it now.

CAPCOM Roger, and it's correct as you have it now.

SC Okay, Don, this is the 174 212 and 64, right?

CAPCOM That's affirmative. And 16, we've got a REFSMMAT if you're ready to accept?

SC Roger, standby on that for a second.

CAPCOM Okay.

CAPCOM And 16, if you can copy, I've got this flight plan update I guess we need to go ahead and get it in.

SC Okay, Don, give me 30 seconds.

CAPCOM Roger.

SC Okay, Don, go ahead with your updates.

CAPCOM Okay, I've got this verb 49 maneuver that is at 201:30. We want to change that from a maneuver to thermal attitude to a maneuver to sco x 1 attitude. And the new angles are at 347 071 000 and the high gain is minus 36 and yaw is 176. And we also want to add alpha particle X-ray cover OPEN at that point.

SC Okay, and we've got a verb 49 maneuver to sco X 1 and the attitude is 347 071 000 the high gain is minus 36 and 176 and we'll open the alpha X-ray cover.

CAPCOM Roger. And at 202:25 --

SC Okay, just a second, I had-- we hadn't updated our time thus far. Well, we're going to get our clocks synch -- here when we

CAPCOM Okay, Ken, I wouldn't bother updating the time very much further because you're going to do a clock resynch here at 202:20.

SC Okay, well, I stopped an hour too soon.

CAPCOM Ken, all you really need to do is in the old --

SC Alright sir!

CAPCOM -- going by the old numbers where it was 224:18 or so, which is now about 202:25 or so, we want to delete that verb 49 maneuver. And at 202:25 or thereabouts, we will resynch the clocks, and that'll bring you up -- the

CAPCOM clock will come 226:30, and we'll pick up with the nominal flight plan which will have you going to bed a couple hours earlier tonight.

SC Okay, very good. Thank you sir. Okay, and what do we do about this -- can we do our PTC REFSMMAT change at the same time when we're in this attitude?

CAPCOM Say again?

SC Can we do our PTC REFSMMAT change while we're in this sco X attitude?

CAPCOM Uh, let me advise you, Ken, standby a minute.

CAPCOM 16, you can go ahead with the maneuver. You'll have about a 68 degree gimbal angle.

SC Say again.

CAPCOM 16, we need to uplink a REFSMMAT to you before you get into the P52.

SC Rog, you have the uplink now.

CAPCOM Okay.

SC I guess the question -- I'm not sure if we got the right question and answer together -- can we do the PTC REFSMMAT platform change in the sco X 1 attitude? Maybe that's the question you answered, I'm not sure.

CAPCOM 16, the answer to that apparently is yes, but you will wind up with a 68 degree gimbal angle.

SC Okay, did you plan for us to do it some other time? or --

CAPCOM Uh, 16, if the 68 degree middle gimbal angle is acceptable to you, we would like for you to go ahead and press on with it.

SC Okay, we'll do that and that'll get us back on time, and we're looking at a 64 degree angle now, so 4 more isn't going to be that different.

CAPCOM Roger.

END OF TAPE

CASPER (garbled) to be that different.
CAPCOM Roger.
CAPCOM 16, we're finished with the uplink.
CASPER Roger.
PAO This is Apollo Control at 201 hours 33
mintes. Apollo 16 now 2735 nautical miles from the Moon.
The velocity to 5782 feet per second and it's continuing to
drop slowly.
CAPCOM Ken, we want the pan camera to standby and
you can deploy the gamma ray burn the rest of the way out.
CASPER Okay, pan camera in standby and will deploy
the gamma ray.
CASPER Okay, the gamma ray's going out.
CAPCOM Roger.
CAPCOM Okay, 16, go pan camera power up.
CASPER Okay, pan camera's power coming on.
CAPCOM And 16, an advisory - when you do it go
to the P52. You'll probably get a 401 alarm, which means that
you've exceeded 60 degrees minimum gimbal angle you can go all the
way, anyway.
CASPER Okay.
CAPCOM 16, Houston. We've got some words on the
LiOH canister anytime you are ready to listen.
CASPER Ah, standby one, Pete. Ken's eyeballing
it.
CAPCOM There's no hurry.
CAPCOM 16, did you call?
CASPER No, sir, be with you in a minute.
CASPER Okay, Don, go ahead.
CAPCOM Okay, on the LiOH canister, the words we
got on it - that we'd never had one of those straps break on
a flight unit. However, apparently if you put more than 128
pounds of force on it you can break 'em. And what we'd like
you to do now is go ahead and change, make that change so
that we don't miss it when we do the clock sync. I be-
lieve it's listed as -
CASPER Now, gee, that's good thinking. I've got
it at 202 20.
CAPCOM Roger, I knew (garbled)
CASPER (garbled) out of the way.
CAPCOM Okay.
CASPER Say again, Don.
CAPCOM I'm just saying it's up close to the time
we're going to sync the clocks. We're afraid we might omit it.
CASPER Yep, that's good thinking. Okay, while
we're changing that out, if you want to do your thing, we'll do
a computer, or do you want us to do the P52 first?
CAPCOM Stand by one.

APOLLO 16 MISSION COMMENTARY 4/24/72 CST 21:02 GET 201:20 756/2

CAPCOM Ken, are you talking about the clock sync?

CASPER Yes, sir.

CAPCOM Okay, I guess we'd like you to do the P52 first.

CASPER Okay. We'll get on with that in just a minute as soon as we get the Lithium change here.

CASPER Hey, Pete, have ya'll got any ideas why Orion didn't hold attitude when we jettisoned?

CAPCOM Ah, I guess I don't have a complete briefing on it. We've got a couple of suspect conditions. We'll try to get back to you later.

CASPER Okay, no hurry on that one.

CASPER Hey, Don, in order to keep lithium thing from driving us buggy on the way home with the time change, we're just going to go ahead and exchange the canisters as they're called out in the flight plan here. And we'd just be skipping the couple that'd be unused. Okay?

CAPCOM Okay, that sounds good, Ken.

END OF TAPE

SC Hey, Pete, is Tony coming on tonight?
CAPCOM That's affirmative. About midnight, I
guess. About 2 hours and 15 20 minutes from now.
SC I guess that's after we go to bed?
CAPCOM I believe that's right, Charlie.
CAPCOM 16, we copy the torquing angles -- they
look real good.
SC Okay, that was in time 202:03:00.
CAPCOM 202:03:00 Roger.
SC Don, how long are we going to be in this
attitude?
CAPCOM Standby one.
CAPCOM About 30 or 40 more minutes, 16.
SC Okay, thank you.
PAO This is Apollo Control at 202 hours 14
minutes. We're preparing to update the clocks in the Control
Center and aboard Apollo 16. You heard CAPCOM Don Peterson
a short while ago discuss this with the crew. And the clock
update will amount to 24 minutes 34 seconds -- or 34 minutes --
we'll try that again -- 24 hours 34 minutes 12 seconds and
at 202 hours 30 minutes, or about 16 minutes from now that
update will be entered into the clocks here in the Control
Center and also into the clocks aboard the spacecraft. Faced
with the problem with correcting flight plans all the way to --
here's a call from the crew we'll pick that up.
CAPCOM Standby, we're just about ready to do that.
Okay, 16, if you'll go ACCEPT we'll uplink this clock sync.
And while they're doing that I'll tell you kind of what's
going to happen. We're going to do it -- the total change will
be 24 hours 34 minutes and 12 seconds. And what we would like
for you to do is on let's see here, page 338 in the flight
plan, we would like you to pick up at about 226:30 in the
flight plan --
SC Hey, Don, I'm sorry you're going to -- hey
Don, you're going to have to start over again. Just as you
started talking, our cabin fan let out a great big moan, and
so we turned it off, and we were all sitting up straight to
see what it was. So would you start over again?
CAPCOM Okay, I'll do that. If you'll go ACCEPT
we've got the clock sync ready to go and it will be a 24
hour 34 minute and 12 second total change in the clocks. And
what we would like for you to do is pick up the flight plan
at the old point of 226:30, actually pick up those events
although your clock may not come out exactly on that time.
And what we're saying is we may cut a little bit into your
rest period.
SC Okay, we're planning to do a little stowage
here that we had never had a chance to get done.

CAPCOM Roger.
SC So we're going to have to do some of that
stuff anyhow.
CAPCOM Okay. The items we'll pick up with, I
guess, are the ones immediately following 226:30 in the old
flight plan.
SC Okay.
CAPCOM Okay, Ken, your clock should be changed
now. And you'll pick up with -- on page 338 where it says
"gamma ray shield OFF," you can go ahead and finish that stuff
up.
SC Okay. I take it that we're going to hold
off on this PTC for awhile until you've had enough time in
this attitude?
CAPCOM Standby one.
CAPCOM Roger, we'd like to stay away from the
PTC for about 15 more minutes.
SC Okay, we'll do that.

END OF TAPE

CASPER Yep, that.
CAPCOM Okay, 16, we'd like you to close the alpha particle X-ray cover now, but we want to leave the X-ray on an extra 30 minutes because we failed to get some calibration down and I'll call you when it should go off.
CAPCOM 16, did you copy on the alpha particle X-ray cover?
CAPSER Rog.
CAPCOM Okay, we want to get that closed and leave the X-ray on and I'll call you when it should go off. About a half an hour.
CAPSER Okay, I closed the cover.
CAPCOM Okay. And also, we'd like to get a read-out TFM for us. That's VERB 5, NOUN 1 1706 enter.
CAPSER How they look to you, Houston.
CAPCOM Standby one, we'll take a look at it.
CAPCOM Okay, 16, it looks good.
CAPSER It's 3 balls 11, okay.
CAPCOM Okay, 16, on those numbers you've got on the DSKY there, if you'll go to the G&N checklist, page 9-4 you can load register 2 and 3 in column BRAVO lines 4 and 5.
CAPSER Okay, G&N checklist, 9-4 put load what?
CAPCOM Load register 2 and 3 in column BRAVO lines 4 and 5.
CAPSER Okay.
PAO This is Apollo Control. We have now completed the clock sync and update, synchronizing the clock aboard the spacecraft and the clocks here in Mission Control with an updated time, advancing them 24 hours 34 minutes 12 seconds. Faced with the choice of making the flight plan agree with reality would require updating events item by item to account for the difference in time introduced when the LM landing was delayed and the subsequent early departure for Earth or making reality an effect agree with the flight plan we've chosen to do the later. Which means that we moved the clocks ahead 24 hours 34 minutes and 12 seconds. And having completed that we're in effect back on the normal flight plan. At present time our clock reads 227 hours 11 minutes 20 seconds. And at this point in the flight plan the crew will be preparing for their rest period. We've asked them to go back and pick up items about 30 minutes prior to that. Which includes putting the spacecraft in the passive thermal control mode, rotating it about it's longitudinal axis at the rate of 3 revolutions per hour to maintain the proper temperature equilibrium. Completing that they'll then begin their presleep checklist and probably begin the rest period around 227:30 although we expect that they will be a little late getting to this. And will begin the sleep period probably 30 to 45 minutes after

PAO that. That's somewhere around 228 to 228:30. In making this clock update it should now eliminate the need for most of the flight plan updates that we have been forced to make for the last several days. The clocks now agree with where we should be in the flight plan. An arbitrary change keeps all of the sequences as they should be and the intervals between the events where they should be. And we'll also have another clock with a nomenclature TV 5, which would be viewable in the - on the monitors in the news center, which is counting the actual ground elapsed time. Which is 202 hours 17 minutes. But time that is in sequence with the flight plan is the updated time, which now reads 227 hours 3 minutes. This time by the way, is arrived at by taking the flight plan time for entry interface and subtracting the predicted entry interface time, using the original or the older GET, the previous GET before we updated, then subtracting the entry interface time that we would have with our previous GET or ground elapsed time, from the entry interface time that is showing flight plan. Now we come up with the difference in time, which is taken care of in the clock updated or 24 hours 34 minutes and 12 seconds. This then is the time that is used for the clock update. And as mentioned previously, we are now more or less back on the nominal flight plan. Now there would be several minor changes, but nothing like the number of changes that we have been experiencing for the last several days.

END OF TAPE

SC Houston, Apollo 16, over.
CAPCOM Go ahead, 16.
SC Rog, we're going to go ahead and service
the accumulator to 55 percent if that's alright with ya'll.
CAPCOM Stand by, one. Okay, you can go ahead
with that, John.
SC Got it. Okay, we're trying to get as many
of these knitpickies out of the way for this EVA tomorrow.
CAPCOM Okay, and in connection with that, surgeon
advises that the CMP will need a new biomed harness prior to
the EVA. We do not have any requirement to monitor the CMP
tonight. We would like to monitor either you or Charlie.
SC Roger. Okay, we decided you can look at
me tonight.
CAPCOM Okay, John.
SC I'll put on a biomed tonight, but I've got
a bunch of things to do before I can get to it, okay?
CAPCOM Okay, fine.

END OF TAPE

SC Pete, looking out of the hatch window towards the back at the (garble) is even getting more stunning. And this brilliant whites and grays against the stark black background looks like the (garble).

CAPCOM Roger.

PAO That was Charlie Duke giving us a visual description of the Moon from a distance of 7200 nautical miles. We are working on some central standard time conversion figures which we'll pass along to you shortly. We'd like to get those checked and verified by the flight activities officer. We hope that will assist in the process of converting the updated GET time to a central standard time.

SC Hey, Pete, how far out from the Moon are we now?

CAPCOM How far out from the Moon?

SC Yeah.

CAPCOM Standby a minute.

CAPCOM Charlie, you're 7294 miles out.

SC Thank you.

SC Hey, Pete, we would like to send you a picture of this if ya'll got -- can tape the TV. This is really a spectacular sight!

CAPCOM Okay, standby Charlie, we'll see what we can do.

PAO That was Charlie Duke telling us he'd like to send us some TV. Our network controller is -- says we're working that right now. The primary problem, of course, is to get the necessary ground lines up --

SPEAKER -- toward items into the flight plan at 226:40 --

PAO And network says we just happen to have lines coming up for television that we were planning to receive from the lunar communications relay unit on the Moon's surface. So we hope that if we can get things in configuration, we'll attempt to get a television picture from the Command Module of the lunar surface.

CAPCOM Get that camera out and we'll work up the lines here.

SC Okay. Okay 226:40 go ahead.

CAPCOM Okay, at 226:40 we want to retrack mapping camera, close the door, put the mapping camera in standby, put the X-ray in standby, and then pick up at 226:50 there in the flight plan.

SC Okay, (garble)

PAO This is Apollo Control again to --

CAPCOM Negative. I guess we lost comment temporary -- say again Charlie.

SC Okay, you gave us a flight plan update for

SC 226, and our clocks now say 227.
CAPCOM That's affirmative. We're going to have to go back to 226. It's just prior to where you go into PTC and pick up these 4 items, and then get into PTC.
SC Why don't you give us a call when you want us to do those, since we don't know when 226 is.
CAPCOM Okay.
SC At 226 right now --
CAPCOM Say again?
SC 226 is suppose to be right now?
CAPCOM Negative, negative. Right now we're showing 227:44:07 8 9 --
SC Okay, but I mean you're saying -- when do you want us to do those items at 226?
CAPCOM Uh, we'll call you when you want you to start in. That's just where we want you. That's the item we want done and I'll tell you when to start.
SC Okay.
CAPCOM Okay, 16, I've been advised it really doesn't matter when you do 'em, as long as we get 'em all done before you go to sleep.
SC Okay. Houston, you're saying we can -- we're now clear to take the gamma ray shield off, the X-ray to standby, the alpha X-ray cover to close, and so forth, right?
CAPCOM That's affirmative.
PAO This is Apollo Control. We're standing by now to receive television from the Command Module. Again to reiterate the situation as far as the TV goes. Charlie Duke reported being very impressed with the view of the lunar surface from an altitude of some 7000 nautical miles, requested that we get things set up on the ground to receive TV. Fortunately we were infact set to do that but not from the command module we're - -

END OF TAPE

PAO ... reported being very impressed with the view of the lunar surface from an altitude of some 7 000 nautical miles. Requested that we get things set up on the ground to receive TV. Fortunately, we were, in fact, set to do that but not from the command module we were planning to turn on the camera aboard the rover on the lunar surface at 11 p.m. central standard time. Consequently, the lines between Goldstone, which is the Manned Spaceflight Network station on which we were to receive the television from the lunar surface. Those lines were up and we were ready to go when we got the word from Charlie Duke that he was planning to turn on the television camera. So, we should be in good shape to receive a color picture from the command module of the lunar surface. The plan as far as the television that we were going to get from the rover is simply to delay that until the crew has completed the television transmission that their planning and then to pick up television from the lunar surface. At the present time Apollo 16 is 7 697 nautical miles from the Moon traveling at a speed of 4 951 feet per second, and we're standing by for television picture. Flight director Pete Frank estimates that it would take the crew about 5 minutes to get the camera out and in operation.

SC Pete, can we take the S band off switch out of SCI to get the monitor set up?

CAPCOM Stand by, one. Okay, 16 we need to get the mapping camera off. Stand by - get the mapping camera to stand by and the gamma ray shield on prior to going out of the SCI position.

SC Okay, the camera has retracted we are going to go to off on the mapping camera and - and again and - the shield is on.

CAPCOM 16, want the mapping camera to stand by and the gamma ray shield on.

SC Okay, yeah okay. Okay, can we go to TV?

CAPCOM Affirm, you can go to TV.

SC Okay, I'm going to have to hit a command reset. Is that alright with super tech comm?

CAPCOM Stand by one. That's affirmative. Go ahead.

SC Okay.

PAO This is Apollo control our network controller reports that we're seeing sync and it looks like the camera is coming up. We don't yet have a picture, but we should have that shortly. And we've got a black and white picture. That should be through the converter.

SC You should have a picture coming down.

CAPCOM Roger. We're waiting for this black and white to get through the converter.

SC Does that look like the Moon to you, Houston?

CAPCOM Not - yes, I guess.
PAO We suspect Charlie Duke is the camera operator, and that view a moment ago was John Young.
CAPCOM Charlie, we'd like you to verify that you got that camera pointed at the right one this time.
SC I happen to be not pointing (garble) camera this time.
SC They don't let - We don't let Charlie make that choice any more; Ken's doing that kind of work now.
CAPCOM Rog. Understand.
CAPCOM Beautiful picture, Charlie.
SC I tell you. Yeah, and it's just about that big, too, from where we're looking. It just - just fills the window just about like that.
CAPCOM That's really a great -
SC Are ya'll getting it real time?
CAPCOM That's right. We just happened to have the lines up for an LCRU picture; so we're getting it real good.
SC Ah, great. Is the LCRU still working?
CAPCOM It was last night, they say.
SC I'll be darned. Did they watch lift-off and everything?
CAPCOM (Garble) you had a beautiful lift-off. Got to watch all of it (garble)
SC How much did you see, Pete?
CAPCOM We got to see about the first 30 or 40 seconds of it real good.
SC Hey, great!
CAPCOM That was something. I guess we'll have to tell you that was spectacular, because you didn't get as good a view of that as we did, I guess.
SC Man, I tell you. That ascent engine coming on, you - you - it was a real - It wasn't what I expected, anyway. At ignition, there, it seems like it sort of sits a little bit, then it grabs you and, boy, off you go! And it takes you a while - at least, it did for me - to get my eyeballs uncaged. And we were - then all I saw out the window was the MESA blanket; then we were back on the gauges.
CAPCOM Rog. It looked like you lifted out of there pretty rapidly.
SC Yeah, that machine just flies so nice. It's just unbelievable. But once you get to ascent stage, it's really light and responsive. Boy, you fire one of those thrusters and it does exactly what you want it to.

CAPCOM Roger.
SC Yeah, this is what you look like after
4 days with no shaving.
CAPCOM Rog.
SC Yeah, we have this chance to show you
the pressure suits.
CAPCOM Roger.
SC You can tell Charlie's real adapted to
zero gravity. A couple of days ago, he couldn't spin that
pencil.
CAPCOM (Laugh)
SC It takes us country boys a little while
to adapt to things, Pete.
CAPCOM Right. I'm with you, Charlie.

END OF TAPE

SC You know Pete, if you took this pan that y'all just saw of the Moon and put in a movie, everybody would say you're faking it. It doesn't look like that. And it's just -- ah, you can't see any stars, just pure blackness and that white gray body sitting out there is really. This is what the well dressed LMP on Apollo 16 has been wearing for the last whatever -- all the way out and all the way back. If y'all get tired of looking, you can just cut off the lines or got to command reset or something.

CAPCOM Rog.

SC One final shot of the beautiful Moon.

CAPCOM Rog. Hey Charlie, why don't you try to give us a closeup of each guy and maybe we can get a playback for the wives tomorrow.

SC Okay, we'll do that.

PAO That view of the Moon came to us from about 8,400 nautical miles above the lunar surface.

SC Okay, we got it off, we'll turn -- bring it up in just a second.

CAPCOM Roger.

SC This is a relaxing attitude for the world -- for the seasons space traveller. Boy, I can hardly believe the last 3 days Pete. That was -- the Cayley plains is really the most fascinating place I've ever been in my life and will ever hope to go and we sure had a good time collecting all the rocks.

CAPCOM Rog.

SC (garble) let you look at somebody else now.

CAPCOM Charlie, everybody else is doing a mental interpolation. The surgeon's standing on his head.

SC I think -- what was that?

CAPCOM I said everybody in the MOCR is doing a mental interpolation except the surgeon, he's standing on his head.

SC That's great. Okay, Ken just turned the camera over, you can have him turn the other way now.

CAPCOM Rog.

SC And then the rest of you can stand on your heads. Okay, I don't know if you can see this or not see this dirty hand.

CAPCOM Oh yeah, we can see that.

SC Can you see the dirt under those finger nails -- can you see the dirt under those fingernails?

CAPCOM Rog.

SC That's Moon dust. You talk about a -- you talk about 2 dirty human beings. It took 10 minutes before we could get Ken to open the door. As soon as he saw us he wanted to close it.

CAPCOM Roger, we understand. He runs a neat ship.

END OF TAPE

SC See his dirty hands.
CAPCOM Oh, yeah, we can see that.
SC Can you see the dirt under those - - can you see the dirt under those finger nails.
CAPCOM Right.
ORION That's Moon dust. You talk about a - - you talk about two dirty human beings, it took 10 minutes before we could get Ken to open the door. As soon as he saw us he wanted to close it.
CAPCOM We understand. He runs a neat ship.
ORION And we're still that way. Yeah, wait'll you see some of these rocks Jim and some of the data that Ken's got. That's really something. The Moon around the alphas I got a chance to look at it today for the first time. It's really - it's really a strange place. How's everybody doing down there at MCC. Is everybody starting to take it easy for a change?
CAPCOM Oh, I think we're all breathing easy now. And if we can we'd like to get a quick look at the CMP cause we're going to have to give up the lines here a couple minutes.
ORION Okay. Will do.
CAPCOM Ken's the only neat guy (garble) on the crew.
ORION What'd you say, you must be blind.
CAPCOM He does dress pretty well.
ORION Notice the reflection off the bald head.
Did the surgeon do a back flip on that one?
CAPCOM Negative. He's not agile enough.
SC Ken doesn't look like he is either.
CASPER I tell you in a J a mission spacecraft. You - - you have to be a midget to do that. or have thought about it a lot before you try it.
SC Okay. We're going to sign off here.
CAPCOM Okay. Thanks a bunch guys. We'll be talking to you again in a minute.
SC (garble)
CAPCOM Okay. And for thermal reasons as soon as you can we'd like to go on now and get into PTC.
SC Alright we'll start up. (garble)
SC PUanet Earth.
CAPCOM Say again Charley.
SC Got any newsy items for today.
CAPCOM No I guess we don't have anything going on right now Charley. Everything's routine.
CAPCOM If you want a news report we can dig one up I think.
SC No, it's not important. Wonder what - you haven't had an update for a while, ya'll must have run out of paper.
PAO This is Apollo Control. That unscheduled TV transmission of the Moon and the interior of the command

PAO module. It lasted for about 15 minutes and it showed us the surface of the Moon from about 8000 nautical miles. Now the crew will shortly be putting the spacecraft into the slow rotation and on it's passive thermal control or the passive thermal control mode. And we hope before to much longer they'll be getting ready to begin their rest period.

PAO This is Apollo Control. We're now getting ready to bring up the camera aboard the rover at Cayley plane Descartes site. And expect to have the camera in operation for about 30 minutes. We have about 10 minutes acquisition time remaining with the 210 - -

END OF TAPE

PAO We have about 10 minutes of acquisition time remaining with the 210 foot dish antenna at Goldstone, California. We'll then be handing over to one of the 85 foot antenna sites for the remainder of the 30 minutes that we expect to get television from the lunar surface.

SC How does the midcourse look, Pete?

CAPCOM Sta - standby 1. Okay, 16, all we have is the G&N data. We don't have tracking data because you are uncoupled. However, based on a G&N data it looks like less than 1 foot per second.

SC Yeah, but, Roosa, Yeah, I forgot about us being uncoupled.

CAPCOM Doesn't look like anything very big. About a foot per second.

SC Yeah, well, I - the G&N thought it did good thing.

CAPCOM Yeah, we concur, G&N looks great.

PAO The noise that we are getting on the downlink spacecraft is due to the handover from the 210 foot dish antenna at Goldstone to the 85 foot dish also at Goldstone. We've now gotten good lock on and should have good solid communication.

SC Houston, 16, on OMNI Alpha. Over.

CAPCOM Roger, 16, you're loud and clear.

SC Okay, we dropped uplink, it looked like, for awhile. Signal strength went to 0 on all antennas and I had a command reset and we're OMNI Alpha, if that's okay.

CAPCOM Roger. Go pitch -70 and yaw 130, we can reacquire on high gain, 16.

SC Ken, 1.

SC Okay.

SC Okay, there you are, Pete.

CAPCOM Okay, you're loud and clear.

PAO This is Apollo Control. We're standing by now for the antennas at Goldstone, California which were locked up on the command module.

SPEAKER Thank you, we're asking what time Tony was going to come aboard and he's just walked in here and gotten plugged up if you've got anything important.

SC Okay, say again.

SPEAKER Earlier you were asking what time Tony was going to come in and he's onboard right now.

SC Okay.

PAO As soon as the Goldstone antenna is properly pointed at the lunar surface we'll be switching over to the lunar communications relay unit camera.

SC I don't know if we told you or not, but Charlie and I think you really did one whale of a job doing

SC those EVA's. We know how tough that is to do all those realtime changes. We just thought you did one heck of a good job and we sure appreciate it. Just wanted you to know that.

CAPCOM Oh, thank you much. But you guys made it awful easy.

SC Hey, Tony. I was setting here today thinking about those rocks we got and the thing that really strikes me is that there was - I really don't think we got any volcanic rocks to speak of, maybe some of those little black glass were volcanics, but otherwise - -

END OF TAPE

SC ... speak of. Maybe some of those little black glass were volcanics; but otherwise, I don't think we got any. There wasn't any there. The - there was one other point that could have been - Those ones we were calling shocks could have been a tough breccia, since they were so friable. But - That might prove to be the case; but to us they looked shocked due to the other features that we saw that are implied a shocked metamorphism. Over.

CAPCOM Right. We - From your description, we had thought there was a good chance that you might have gotten a tough breccia, there. I think, also, the fact that the lot of the breccias were one-rock breccias would mean that you may have your basalts or garro or anorthosite or whatever, and that they're just broken up. If they're one-rock breccias or two-rock breccias, it still has most of the information of the rocks we're looking for. It's not like a, you know - if you remember, it's not like a soil breccia, where everything is lost. So we're very happy with what you've found. Also, did anyone brief you on the newest on the X-ray results?

SC No. Go ahead.

CAPCOM Okay. Remember the first I - the first look that I reported to you indicated that the aluminum to silicon ratio was sort of intermediate. Well, they've gone back; and with the newer data and a better analysis, it turns out that Descartes has one of the highest ratios on the Moon. The only place we've seen like it right now is on the east side of Smythii. We don't really have a good comparison yet but the (garble). But anyway, it indicates that if anyplace has anorthosite, you've found them.

SC I tell you, Tony. Some of those rocks that we picked up - I was leaning, with the color and the crystalline structure that we had - they really gave me the - I didn't want to call it that, but they were certainly crystalline rocks; and there was no question in my mind. They had a sugary texture - the whitish ones. That big one around the North Ray, there, with the shatter cone that had a bluish tint to it in the crystalline structure. Though, it might have been just the - an (garble) crystalline structure, or it might have been an (garble); but ya'll can sort all of that out when you get - I tell you, it really wasn't what we - I thought we were going to find up there. I imagined a lot of volcanics, and frankly, if these shocked rocks turn out to be tough breccia, that will be the only volcanics we've found.

CAPCOM Roger. Understand. I think the fact that you recovered from the picture we had given you before you went and went ahead and found out what was there and

sampled it so well - I think that's a good indication that the training was good and you guys are really on the ball.

SC Well, we tried hard, anyway, Tony, and I think we got every - a piece of every rock that was up there. I really do. They were - And that's, I think, because we were lucky and the rocks were identifiable.

CAPCOM You know, the difference between a rock being identifiable and not being identifiable is the level of training. That just says you guys are well-trained.

SC Well, you guys tried to beat it into us long enough, I'll tell you that. Hope we did a good job.

CAPCOM I just got a set of questions that the Geology Team would like to send up to you sometime. Maybe sometime during the transearth coast, we'll have a chance. I haven't really read through them, so I don't know what they're all about yet.

SC Okay, well, we're going to go into an eat period and an EVA prep and try to get some rest before the EVA tomorrow, so we'll wait on those. Okay?

CAPCOM That's fine. Hey, we have the TV back on on the Moon up there, and everything's looking fine. It hasn't changed much since you left.

SC Well, we were glad that ya'll were able to watch lift-off. We heard that you got about 30 or 40 seconds, which, I think, was neat. It took me about that long to uncase my eyeballs when that ascent engine lifted off.

CAPCOM (Laugh) Oh, great!

SC It certainly wasn't what I thought I was going to experience.

CAPCOM Yeah. INCO is really on the ball, They tracked you right up.

SC Well, that's just super.

CAPCOM I don't know - We don't know whether Ken understood the uplink while ago on the biomed harness. The idea is that he's going to have to change it before the EVA in the morning. So, if he'll sleep better without one on tonight, he can take the old one off, now.

SC Okay, we'll tell him.

SC And, Tony, the - On that - On the rocks, back to one other little point, there. You know, we called the whitish rocks tough breccias - I mean, shocked rocks. But we're - At least, I'm personally convinced that there are at least two endogenic craters that we passed, and - the big one on the way to North Ray and the big one coming back from Stop 8. And so, that might have been a source of a tough - if that's they turn out to be.

CAPCOM Very good. I just want to emphasize again that -

SC (Garble) situation, though.

CAPCOM Right. I understand. I just think it was outstanding, maybe serendipity, that we probably - your landing there at Descartes probably sampled the most differentiated place we could find on the frontside of the Moon. I think that's really outstanding.

SC That's the feeling I got when we started seeing those rocks. That basalt that I called under the engine bell there, I think, might end up to be that blackish-bluish rock that we sampled up at North Ray, and so we'll - but we'll see. We couldn't get any of what I call real basalt in rocks. Maybe some of the class will be, though.

CAPCOM Okay.

SC Could you tell from the TV, Tony, how rough that place was? Could you see all those swells and valleys that we didn't have mapped on our - that didn't show up on our map that were maybe, some of them, 30, 40, 50 meters deep?

CAPCOM Yeah, I sure could. I reminded me of a dune area.

SC Yeah, that's what it sort of looked like, sort of a dunes plains.

CAPCOM Incidentally, somebody here is kind of worried about the thermal problems and would like to get into PTC as soon as possible.

SC Okay, as soon as the rates get low enough, we will.

CAPCOM Okay.

SC Are the rates good enough now?

CAPCOM Negative.

SC Tony, that one - that crater at - the endogenic one that we described coming back from North Ray and going out, it was - I was guessing 80 meters and John said about 50, but it was really deep, and I'm surprised that we didn't - I sure had no feel for that before we started.

CAPCOM Right. Understand.

SC I'll tell you one thing - you're hair sure doesn't feel very good up here after 3 days with it full of orange juice.

CAPCOM I don't know. It may do great things.

SC That stuff is great glue, I'll tell you. Boy, we were really worried about getting those helmets off, but they came right on off after we eventually broke the thing and got them cleaned up, then.

CAPCOM Okay, and on your flight plan, there, at right about 227 for setting up for PTC, I guess your DAP has to be set up for BD roll.

SC Okay. Houston, can you give us a holler when these rates get good enough to start PTC?

CAPCOM Sure will.

CAPCOM Apollo 16, last time you changed the LIO Canister, did you happen to wiggle the other one and see if it had swelled up in there?

SC No, we sure didn't. The one out of B came right out.

CAPCOM Okay. Don't worry about it then.

PAO This is Apollo Control. We've now been receiving about 10 minutes worth of television from the lunar surface from the camera on the Rover. And we can see that the lens appeared to get a fairly good dusting when the LM lifted off. Although the camera does appear to be functioning well, the picture is not as sharp and clear as it was prior to LM lift-off. And we do, as I mentioned, attribute that to dust on the lens. We expect to have the camera in operation. It's being controlled remotely from the INCO's Console here in the Control Center, and we expect to continue this operation for about 15 or 20 minutes longer. We will be switching off of the 210 foot antenna at Goldstone to an 85 foot antenna, shortly, at which time we would expect the picture quality to drop somewhat. Also, the picture is not being enhanced at the present time.

CAPCOM Just a brief report from the home fronts, here. Everybody's healthy and happy, and not just a little bit proud.

SC Boy, you had me worried there for a second.

SC Thanks, Tony. Appreciate it.

END OF TAPE

PAO spinup. That's the signal that they may begin the passive thermal control mode, putting the spacecraft in a slow rotation of 3 revolutions per hour. Prior to the -- following the PTC, after getting spacecraft spun up, the crew will have completed all of the activities required before beginning their sleep period. We are planning to have a change of shift news briefing. Be in the small briefing room in the MSC news center. And we estimate that that will begin in about 15 to 20 minutes. Again, that briefing about 15 to 20 minutes from now in the MSC news center briefing room. At 228 hours 46 minutes updated ground elapsed time, this is Apollo Control Houston.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4-24-72 GET 228:47 CST 23:55 MC-76771

PAO This is Apollo Control. The change of
shift briefing in the new center is about to begin.

WHITE all, if any communications from the crew
of Apollo 16 will be recorded for playback after the press
conference. This is Apollo Control.

SPEAKER Okay, looks like --

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4-25-72 GET 229:39 CST 00:46 MC-769/1

PAO This is Apollo Control at 230 hours 7 minutes ground elapsed time. Apparently Apollo 16 crew has indeed gone to sleep, without saying good night. Distance, 14,250 nautical miles out from the Moon, velocity 4,658 feet per second relative to the Moon. Spacecraft now weights 27,427 pounds and at 230 hours 8 minutes ground elapsed time this is Apollo Control out.

END OF TAPE

PAO This is Apollo Control 231 hours 47 minutes ground elapsed time. Apollo 16 crew asleep at this time. No communications from them in over 2 hours -- 2 and a half hours. Distance 18,747 nautical miles outbound from the Moon. Velocity 4,568 feet per second. For the statistical minded, here is some numbers on leaving the Moon's sphere of influence. The halfway mark in distance, the halfway mark in time. We exit the lunar sphere of influence in about 6 hours at a ground elapsed time of 237 hours 27 minutes 51 seconds and at which time the distance from the Moon will be 33,821 nautical miles. Height above the Earth at that time 187,827 nautical miles. The halfway point and distance will take place at ground elapsed 266 39 00. The distance to both bodies, Earth and Moon at that time will be 112,726. The halfway time in the Moon-Earth transit will take place at ground elapsed time of 257 45 12. At the halfway point in time the distances are 87,593 from the Moon and 138,683 from the Earth. At 231 49, this is Apollo Control.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4-25-72 GET 232:46 CST 3:54 MC-771/1

PAO This is Apollo Control 232 hours 47 minutes
ground elapsed time. Some 3 hours 12 minutes remaining in
the Apollo 16 crew rest period. Crew apparently sound asleep
at this time. Meanwhile the spacecraft is 21,445 nautical
miles out from the Moon approaching Earth at 4,532 feet per
second. And during this graveyard shift that's about all
there is to say. At 232 47, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control 235 hours 47 minutes ground elapsed time. Although the wake clock shows 12 minutes remaining in the sleep period the crew actually will probably sleep an additional hour and half. No more than that unless they wake up and call the Control Center earlier than hour and half from now. Distance 29 421 nautical miles out from the Moon. Velocity 4469 feet per second. Some of the major events coming up during the day would be the mid-course 5 if it's actually performed. That still hasn't been pinned down yet why they're not. The velocity change is great enough to weren't doing it this time. The transearth EVA to retrieve the film cassettes from the scientific instrument module. Additional runs with some of the instrumentation in the SIM bay, gamma ray and x-ray equipment. And that pretty well fills up the work day with the next rest period scheduled to begin at about 252 hours 30 minutes. At 235:49 this is Apollo Control.

END OF TAPE

APOLLO 16 MISSION COMMENTARY, 4/25/72, 8:35 CST, 237:28 GET, MC774/1

PAO This is Apollo Control, Houston, at 237 hours 29 minutes ground elapsed time. We now show Apollo 16 at a distance of 187 791 nautical miles away from the earth. And now travelling at a speed of 3750 feet per second relative to the earth. In the Mission Control Center we've had a change of shift. Our flight director at this time is Phil Shaffer and filling the Capcom position at this time Henry Hartsfield. We'll stand by now with the line open awaiting for a crew callup. We're at 237 hours 30 minutes ground elapsed time and this is Apollo Control, Houston, continuing to monitor.

CAPCOM Apollo 16, Houston.

SC Good morning, Henry.

CAPCOM Good morning. Is everybody wide awake and feeling great this morning?

SC We even used the extra hour.

CAPCOM We're coming up on antenna switch and I think the comm is a little bad but right off the bat we'd like for you to remain in PTC.

SC Okay.

CAPCOM And we'd also like for you to take the up telemetry command switch off for 3 seconds. We've got that same commanding problem we had during coast out to the Moon.

SC Okay. It's off and back to normal.

CAPCOM Roger. That cured up the commanding problem.

SC Good show.

SC Hank, before we copy our flight plan updates do you want us to start on the 236 hour item?

CAPCOM Roger. We'd like for you to get started on the postsleep checklist and rather than read you a bunch of things to start with I think I'll just remind you of a few things to catch you up. I've got a list of them here. While you're doing that could you get somebody to pull the gamma ray boom in I'd appreciate it.

SC Okay. You want that all the way in?

CAPCOM That's affirmative. And you'll need your logic power, so get that in.

SC Alrighty. Thank you, sir.

CAPCOM And we'd like to get the S-band normal mode switch to voice.

SC That already is voice.

CAPCOM Okay.

SC We couldn't talk to you if we weren't in voice, Pete.

CAPCOM Roger. We were in downvoice backup there and then command in normal.

SC I got you.

CAPCOM And Ken, for your information, we've scrubbed the corona window calibration and the Skylab contamination

APOLLO 16 MISSION COMMENTARY, 4/25/72, 8:35 CST, 237:28 GET, MC-774/2

CAPCOM photos.

SC Okay.

CAPCOM And we're going to stay at PTC right up to
the midcourse 5 and if you're - can get to it now, Ken, I'd
like to get the image motion on and the mapping camera on.
And then give me barberpole plus 2.

SC Okay. Just a second. Let me catch up here.

END OF TAPE

SC Hank, did you say you want the mapping camera image motion on and mapping camera on.

CAPCOM That's affirmative, Ken. We want to get the image motion on, the mapping camera on, barberpole plus 2 and we're going to leave it shut up in there. We're just running the film out.

PAO This is Apollo Control, Houston, at 237 hours 37 minutes ground elapsed time. The crew of Apollo 16 given some extra sleep time this morning. Two of the earlier items scheduled have been deleted from the flight plan, the corona calibration photography and the Skylab contamination photography.

PAO We're at 237 hours 38 minutes ground elapsed time. We show Apollo 16 at a distance of 187 462 nautical miles away from the earth and traveling at a speed of 3755 feet per second relative to the earth.

CAPCOM Apollo 16, Houston.

SC Hello.

CAPCOM Roger. For your information, old mother Earth's got you now and you're coming home.

SC That's nice to know.

SC Hey, Hank, it had us last night.

CAPCOM Roger. We're just now showing you crossing into the Earth's sphere.

SC What's some words on the midcourse 5.

CAPCOM Roger. Midcourse 5 will be about 4 feet per second. It will be an RCS burn.

SC Roger.

PAO That was Capcom Henry Hartsfield advising the crew of Apollo 16 that they're now in the Earth sphere of influence.

PAO We show 1 hour 41 minutes till time of the midcourse burn. This with the Delta V of about 4 foot per second performed with a reaction control system. We're looking presently at a burn duration of 8 to 9 seconds.

PAO We now show Apollo 16 187 381 nautical miles away from the earth.

SC Hank, would you say again what you wanted done with this mapping camera, please.

CAPCOM Roger, Ken. We just want to run the film out and leave the door shut. We want to get the image motion on, mapping camera on and barberpole plus 2. That gives us a high speed.

SC Okay.

CAPCOM And 16, Houston. Whenever you get a chance, we'd like to get yesterday's crew status and today's crew status report.

SC Okay. Let them work on it.

END OF TAPE

CAPCOM Apollo 16, Houston. When you get a break there, I do have a few flight plan changes I'd like to get up.
SC Okay, Hank. Let me finish this status report thing. It all uses the same book.

CAPCOM Okay.

CAPCOM Ken, we need the gamma ray boom switch off. It didn't quite make it all in. The motors still running. It's to a safe position.

SC Okay, thank you. Thank you, sir.

CAPCOM 16, Houston. We'd like to verify that you heard my transmission on holding PTC to midcourse 5.

SC That's affirmative. Hold PTC till midcourse 5.

CAPCOM Roger, and for time purposes, we'd like to get a P52 in sometime in the next 25 minutes.

SC Well, for work purposes, Ken is putting up the optics now.

CAPCOM Outstanding.

SC Okay, here's the crew status report, starting with the item A-1 for the commander. Skip the PRD, it's in the pressure suit, which is in the bag, and it's down - and it's very dusty, and I'd like to wait till we get ready to suit up for the EVA and I'll ready you the PRD then.

CAPCOM Okay.

SC A3, it's day 8, 7 hour - 7 hours, good sleep, nope. A4, none. Day 9 still getting the PRD reading from the same days. 6 and 3 quarters hours, good sleep. 8-4, none. On the CMD day 8, B1 15059, B3 5.5 good sleep. B4 none. Day 9, B1 1564, B3 7 hours, good sleep. B4 none. On the LMP, day 8, skip the PRD, and suit was out of the way then, C3 7 hours, good sleep. C4 none, and Charlie remembered to get his PRD reading machine out to day, and CML is 21143 C3 7 hours, good sleep, C4 none. Did we loose you doing any of that, Hank?

CAPCOM Negative, John. We got it all.

SC Okay. Now on to the menu. We'll get back to the, to good old Casper here. We're working on day 8, meal C. And for the CDR, it's up to doing the hamburger for beef gravy, and scratch the ginger bread.

END OF TAPE

SC - - were day 9 meal A, scratch the peaches, and the grits. Day 9 meal B scratch the hamburger and add meatballs with sauce. For day 9 meal C scratch the pecans. And for the CMP - okay for the LMP, with all of day 8 scratch the mixed fruit, the ham steak, the white bread with jelly, on meal B scratch the pea soup, the meatballs, the pork and scalloped potatoes, meal C scratch the chocolate bar and the gingerbread and add pineapple and a hamburger. On day 9, scratch the peaches the scrambled eggs and the bacon squares on meal A, on meal B scratch the hamburger and white bread, the instant breakfast the cereal bar, meal C scratch the pecans only. On the LMP, day 8 last meal scratch the beef and gravy and substitute a hamburger and scratch 2/3 of the chocolate bar, scratch the gingerbread. On day 9 meal A scratch the peaches and on meal B scratch the hamburger in a wetpack and the cereal bar and add turkey and gravy. On day 9 meal C scratch the pecans only and add an orange drink. I think that about does it.

CAPCOM Thank you, John. The surgeon is happy and we didn't get any biomed on you last night. Could you check your system. Do you have any idea why it didn't work?

PAO That was John Young passing along the crew status report.

SC I had it plugged in. I had it plugged in the night before last too. I don't understand that. I got the leads tied.

CAPCOM Okay. We're getting the carrier, John, we're just not getting modulation. So there must be something fouled up in the system there.

SC Okay. Well, why didn't you tell me. I could have changed this sensor out - or this - it's probably in this box here, don't you reckon.

CAPCOM Okay. When you get a chance, John, just check it out. And we were - we lost our data on the antenna switching with your P52. Could we get those angles please?

SC If you have any idea what it might be that I could do to fix this -

CAPCOM 16, Houston.

CAPCOM Apollo 16, Houston. We just went through an antenna switch there and I lost anything you said then and John if you're asking about the sensor there, the only thing we could suggest is to check the connections there into the blue signal conditioner and maybe change out your sensors or service them.

SC Okay. I can't believe that if you got the carrier that changing out the sensors is going to change anything. These things are really stuck on there.

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SC Let me try something.
CAPCOM Okay. Whatever you did, John, it worked.
We got us some signal there..
SC I didn't do anything. It's working now?
CAPCOM It's working now. And what angles are you showing on your high gain now on your meter?
SC Showing 50 - minus 50 pitch - make it 45 and about 260 in yaw.
CAPCOM Okay. They want to know now what's on the knobs.
SC Okay. Right now it's reading - we'll get the pitch, minus 40 and minus 40 on the knob and it's reading 90 degrees in yaw and still about 255 in yaw on the indicator.
CAPCOM Roger.
CAPCOM And, 16, we'd like to get the P52 data.
SC Okay. We've got stars 15 and 22 NOUN 05 all zeroes, NOUN 93 minus .040 plus .030 plus .058, torqued at 213:23:55.
CAPCOM Roger. We got them.
PAO Apollo Control, Houston. That was Ken Mattingly passing along numbers that he read off while alining the platform. We're at 238 hours 14 minutes. We show Apollo 16 186 141 nautical miles from Earth.
CAPCOM And, 16, whenever you're ready, we'll give you a few of these changes.
SC Okay. Charlie's ready to copy.
CAPCOM Okay. At 238:20 in the flight plan -
SC Okay. Go ahead.
CAPCOM Roger. Gamma ray shield off. Stand by, Charlie. They say it's already off.
SC The shield's off right now, Hank.
SC We just turned it off, Hank.
CAPCOM Okay. In that next group of data there, delete anything that refers to the mass spec, since we don't have it any more.
SC Okay.
CAPCOM And about 238:50 we want gamma ray shield on.

END OF TAPE

SC Okay.
CAPCOM And the group of data concerning the P30, we want to start the P30 actually, around 238:46, but we'll have to get you uplinked and we're working on that now.
SC Alright.
CAPCOM And you'll exit PTC prior to that, put that in just ahead of the P30.
SC Okay, exit PTC right in front of the P30.
CAPCOM Roger, using the SIM bay jett configuration.
SC Alright.
CAPCOM And as soon as we get the sextant star check data and on over 239 we'll get the dumps out of the way.
SC Okay, we will. We'll start the dumps right after the star checks.
CAPCOM Okay, at 239:30, the high gain angle -
SC Hold the phone a minute. Okay, go ahead.
CAPCOM At 239 30 - you read Charlie?
CAPCOM 16, Houston. How do you read?
SC You're 5 by Hank, go ahead.
CAPCOM Okay, at 239:30 those high gain angles should be minus 16 and 58.
SC Copy, minus 16 and 58.
CAPCOM Okay, and if you'll flip on over to page 351 -
SC Go ahead.
CAPCOM Okay, as we call, we need another hour for suit donning so that time there at 241 at the top of the page will now be 242 so there's actually an hours gap between the previous page and this one. And you can change your time accordingly adding an hour on to - you get down to hatch opening or till you get on the EVA cue card, and then we'll pick up the flight plan after the EVA. At 242 hours, that's after it's changed there where it says verb 49 manuever to EVA attitude, the new attitude is 037043038 and the high gain angles are minus -
SC Roger, 03 -
CAPCOM High gain is minus 10 244.
SC Okay, we change verb to 49, angles to 037 the other 2 are the same, high gain minus 10 244.
CAPCOM Okay, Charlie. They just changed that YAW angle while I was reading it up. It's 224.
SC Okay, 224.
CAPCOM Okay, down about - a few lines down where it says load need attitude, that attitude now is 071 051 039.
SC Copy, 071 051 039.

END OF TAPE

CAPCOM Okay, and if you'll flip the page now, page 352, the new time there is 243:40. Where it says maneuver to meet attitude, we want to change that again to 071 051 039 and the high gain angles are minus 34 218.

SC Okay, at the, this whole page has slipped an hour, and it's at 243:40, 071 051 039 to minus 34 and a 218.

CAPCOM Roger, Charlie, and we need to make those appropriate changes on the cue card and then the EVA checklist, and I have those locations if you want to do that.

SC Well, we'll do that, Hank. We promise.

CAPCOM Okay.

SC Is that all you've got for now?

CAPCOM That ought to take us to the EVA, Charlie.

SC Thank you, sir.

SC Okay, 238 to 105. (garble)

SC (garble)

CAPCOM Apollo 16, on the high gain. Go MANUAL and WIDE and then REACQ NARROW.

SC Go ahead.

END OF TAPE

PAO This is Apollo Control, Houston, at 238 hours 36 minutes ground elapsed time. We now show Apollo 16 at a distance of 185 317 nautical miles away from the Earth and traveling at a speed of 3783 feet per second and we've been experiencing some noisy comm with Apollo 16. Meanwhile, mid-course correction number 5 is presently scheduled for 239 hours 20 minutes 56 seconds ground elapsed time with a Delta V of 3.4 feet per second, a burn duration of 8 seconds. This will be performed with the reaction control system thrusters, posi-grade to change the flight path angles from minus 8.6 to minus 6.5 degrees. We presently show Apollo 16 with a spacecraft weight of 27 409 pounds, at 238 hours 37 minutes ground elapsed time, continuing to monitor, this is Apollo Control, Houston.

CAPCOM Apollo 16, Houston. I have your midcourse 5 plan and if you'll give us ACCEPT we'll uplink the target load vector.

SC Okay. Stand by 1.

CAPCOM And we're also sending a PIPA bias with that load.

SC Okay. You've got the computer.

SC Hank, go ahead with the PAN.

CAPCOM Roger. MCC-5, RCS G&N 27 409, NOUN 48 is NA, 239 20 5586, NOUN 81 plus 000 34, all zips, all zips, 079 306 346 HA is NA, plus 00 217, 000 34 008 000 34 04 0479 391, boresight star 056, up 270, left 35, and for Ken's information, that's Beta Sentarian, it's on the white chart and it lies between Atria and Acrux. Continuing NOUN 61 minus 0073, minus 15619, 10463, 36277, 2902404, Sirius and Rigel 219 166 313, four jets plus X. High gain angles, pitch minus 90, yaw 285 and a note that the EMS is not bias for drift.

SC Okay. We copy midcourse 4 RCS G&N 27409, NA for NOUN 48, 239 20 5586, plus 00034, plus all balls, plus all balls, 079 306 346, HA is NA, plus 00217 00034 008 00034, 04 0479 391, 056, up 270, left 35, Beta Sentaria, minus 0073, minus 15619, 10463, 36277, 2902404, Sirius and Rigel 219 166 313, four jets plus X. High gain, plus pitch minus 90, yaw minus 285 - pitch minus 90 yaw plus 285, EMS not bias for drift.

CAPCOM Good readback. And we'd like to get the gamma ray shield off.

SC The gamma ray shield is now shielding.

END OF TAPE

CAPCOM Apollo 16, Houston. We're having a little trouble getting your high gain to acquire, so we'll be calling your OMNI switches so we can maintain voice.

SC Okay.

SC Hank, I had a question here. You said to exit the - use the SIM bay jet configuration, and then I noticed where you called up for a plus X 4 jet on the midcourse. Are those two things compatible?

CAPCOM Roger. What happened there, Ken, was we were going to do a gamma ray extension for a little - out a little ways, and we've cancelled that now, so that's not even a requirement anymore. You can use normal jet configuration.

SC Okay, thank you.

CAPCOM And 16, OMNI alpha.

SC Okay, you have OMNI alpha with a command reset.

CAPCOM Roger.

SC And Hank, can I go ahead and stop PTC passing 79° roll this time.

CAPCOM That's affirmative.

SC Okay. And how about the status of the computer. You guys still using it?

CAPCOM The computer's yours.

SC Thank you.

CAPCOM OMNI Bravo, 16.

CAPCOM OMNI Bravo, 16.

SC You have it.

CAPCOM Roger. How big is the moon this morning.

SC Haven't gotten around to looking yet, Hank. Okay, Hank, at arms distance, if you cup your fingers around it, it's about as big as a 50 cent piece, but you can sure tell that it's changed size for the smaller, but we still feel like we're still pretty close to it. Like I - I don't know how far away from it we are, but probably about maybe 25 or 30 thousand miles. No, I can't tell from the 53.

CAPCOM Roger, we show you about 30 thousand.

SC Somebody left the computer running. 30 thousand. Okay.

CAPCOM Take it back, they reread about 38 thousand.

SC Okay.

CAPCOM And 16, when you get the attitude, we would like for you to bring up the high gain, and your there.

SC Roger.

PAO At 238 hours 59 minutes ground elapsed time. We now show Apollo 16 at a distance of 184,476 nautical miles away from the earth. Now traveling at a speed of 37 hundred and 95 feet per second. That was John Young that you heard providing a description of the moon as he viewed it out the cabin window, and we checked here in Mission Control, Hank -

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SC rate on the high gain.
CAPCOM Reading you 5 by 5, Charlie.
SC Okay, you're in reacting error.

END OF TAPE

SC Houston.

PAO This is Apollo Control, Houston, we're 20 minutes away now from time of ignition from the mid-course correction 5 scheduled at 239 hours 20 minutes 56 seconds. This will be a burn that will provide a Delta V of 3.4 feet per second with a duration of 8 seconds. Done with the RCS pulsic rate that will change the flight pass angle from minus 8.6 degrees to minus 6.5 degrees. We're at 239 hours 2 minutes ground elapsed time, Apollo 16 now 184 380 nautical miles away from the earth. This is Apollo Control, Houston.

CAPCOM Apollo 16, Houston. We're getting close that mid-course and we'd like to ahead and get the dumps out of the way. That former aline looks good so you could omit the star check, if you like.

SC We just looked at the foresight star. That's a good one. We're back along -- that's from the sextant check and we're in process of dumping.

CAPCOM Real good. Could you find that star 56?

SC Oh, yeah. Alphabeta are the two of the prettier stars you can find. Even I could recognize those.

CAPCOM That's good.

CAPCOM Ken, we got a list of questions here on the SIM bay inspection when you get down to the EVA and we can handle them anyway you like. It's about a page and a half of them. Would you rather I read them up after you're out or --

SC Okay, get them in. No, I'd like to hear them first, but not right this minute.

CAPCOM Okay, I just want --

SC I'll give you a call in just a minute when we get squared away here.

CAPCOM I just wanted to appraise you of the fact that I had them and then whenever you're ready we'll talk about them.

CAPCOM 16, Houston. Did you have any trouble with your loud canister change today?

SC No, sir.

CAPCOM 16, we'll show you about 10 percent on the waste pack.

SC Thank you, boxx.

PAO This is Apollo Control, Houston at 239 hours 12 minutes ground elapsed time less than 10 minutes away now from the mid-course correction number 5 burn, and we presently show the onboard computer in program 30. This is the external Delta V program which is used for engine ignitions. We're at 239 hours 12 minutes ground elapsed time and Apollo 16 now 183 995 nautical miles away from the earth. This is Apollo Control, Houston.

PAO This is Apollo Control, Houston, the onboard computer now in Program 41 of the SC RCS program to provide a prevert attitude for an RCS thrusting maneuver. We're now 7 minutes away from time of ignition for mid-course correction number 5.

SC Hey, Henry?

CAPCOM Roger.

SC Hey, I put on some new sensors up. How about seeing that your friends on the left there are happy with that.

CAPCOM Okay.

CAPCOM They look great, Ken.

SC Okay.

PAO Apollo Control, Houston, 2 minutes away now from time of ignition from mid-course correction number 5. We're at 239 hours 19 minutes ground elapsed time.

PAO Flight Director, Phil Shaffer, taking a final status check in Mission Control for mid-course 5.

CAPCOM Apollo 16, Houston. You're looking good, and you're go for the burn.

SC Okay.

PAO One minute away now from mid-course 5.

PAO Apollo 16 now 183 706 nautical miles away from the earth.

PAO 10 seconds away now.

PAO Guidance reports plus X.

PAO Standing by now for burn status.

SC Okay, Houston, I guess you saw that the burn was nominal. Our residuals minus 110 plus 0 minus 110 and you probably saw our NOUN 20 for that attitude, over.

CAPCOM Roger. We copied the NOUN 20.

PAO This is Apollo Control, Houston. That was John Young reporting a nominal burn on mid-course correction number 5.

SC Hank, you want to leave the mapping camera on, is that correct?

CAPCOM That's affirmative, Ken.

SC Okay.

CAPCOM Ken, the mapping camera is out of film, but the stellar camera is still feeding a little.

SC Okay. We gave a bunch of stars to look at just then.

SC Hank, is the high gain gonna to track us to this maneuver or should we set it manual and reacquire what we --

CAPCOM It seems to be tracking good now.

SC Never mind. Hey, I'm going to start

SC battery B charge?

CAPCOM Copy.

PAO Apollo Control, Houston. 239 hours
25 minutes ground elapsed time. Apollo 16 now 183 521 nautical
miles away from the earth. Velocity now reading 3809 feet
per second. Mid-course correction 5 are completed and as was
reported by Apollo 16 a nominal on time burn.

PAO We're at 239 hours 25 minutes continuing
to monitor.

SC When we were allowed to sleep to these
periods there, did we move the EVA back or anything like
that?

CAPCOM Negative. The EVA is -- it's a nominal
time including that hour, you know, that we had that put in
there. 1 hour slip from what was originally in the flight
plan.

SC Okay. We should trade it off eating and
sleeping this morning, is that it?

CAPCOM We were hoping you were grabbing some
snacks in there this morning.

SC Man, with three guys in here, Hank, you
just -- when it comes time to eat, you just bring everything
to a halt and go do that cause everything has to be done in
the kitchen. You got to take your 52's and you got to do
everything else right in one place. We'll grab something
and we're being pressured in here won't -- we'll probably
come pretty close to the schedule.

CAPCOM Okay, we're scheduled for hatch open
at 242 55.

SC Okay, we'll try to be there and if we
don't make it there, why, we'll get it as soon as we get there.

CAPCOM Okay.

END OF TAPE

SC Hank, we just looked at the battery compartment pressure. We're reading 3.4. Do you want us to vent that thing?

CAPCOM Can do it.

SC Okay, Hank. And I can copy your comment about the SIM bay now if you'd like to give them, I'll move over.

CAPCOM Okay. In regard to the mapping camera, they want to check the interference. Inspect the periphery of the mapping camera and laser altimeter for any evidence of interference. The last attraction on that thing was nominal.

SC Okay.

CAPCOM So it's kind of puzzeling, you know. It started out real slow and each retraction it got faster.

SC It's just getting warmed up.

CAPCOM Rog. Some of the things they suggest you might look for is around the cable there between the mapping camera and the shelf, is there any damage to the cable? Clearance in that area of the cable? And whether the cable is caught or curled - -

SC That cable is located on the plus X side of the camera over on - towards the E quad, is that correct?

CAPCOM That's affirmative.

SC Okay. Thank you.

CAPCOM Okay. We want to know if that cable is caught or curled or is it smooth, you know, like it's supposed to be. That's between the - what I would call the top of the mapping camera and the bay there by the hand hold.

SC Okay. I know the area. I'm not sure we're going to have enough light to see down in there in the EVA attitude. We'll take a look at it.

CAPCOM And we'd like to know a little something about the cuckoo door. Do you know which one that is. The little white door that goes over the stellar lens.

SC Okay. I won't be able to tell you much about that in the retracting position either.

CAPCOM Roger. If possible, we'd like you to lift up that door and inspect for clearance between the hinge and the top of the mapping camera and look for any scrape marks on the camera or on the door and any evidence of twisting or bending of the stellar lens glare shield.

SC Okay.

CAPCOM Any question on that part with reference to the mapping camera, Ken?

SC Say again.

CAPCOM Did you have any question about any of those mapping camera items?

SC No, sir.

CAPCOM Okay. In regard to the pan camera, we'd like for you to look at the exposure sensor and that's the ones that's immediate to the left of the lens barrel.

CAPCOM And we need AUTO and HIGH GAIN.

SC Got it.

CAPCOM Okay. In regard to that automatic exposure control sensor that - there, Ken, what we're looking for is foreign objects or contamination.

SC Okay.

CAPCOM And the little thermal shield that goes around the periphery of the lens barrel, why don't you check that for contamination and then also the lens barrel itself. And we're looking for contamination really on all of the pan camera and the same goes for the V over H sensor.

SC All right.

CAPCOM And just to refresh your memory the V over H sensor is the one that's on the right side that's got the little hood on it.

SC Okay.

CAPCOM And for the gamma ray boom, what we'd like to do is inspect the cover for any damage. You know, that thing is closed a couple of times or the boom is retracted all the way a couple of times and a couple of times it hasn't. So we're expecting that the gamma ray boom right now is about six inches out but we're not sure. We'd like for you to look at the cover and if it's not fully closed, give us an estimate of how far it's open. Full open is about 134 degrees.

SC Rog. I'm familiar with that.

CAPCOM Okay. If the cover is partially open - -

SC Okay. Is Bill taking bets on where it is?

CAPCOM He's not too brave. He'll bet you a cup of coffee it's about 6 inches.

SC Okay. I heard that. (garble)

CAPCOM He said he takes it, and we'd like to know how far that rail protrudes through the bind there, and if you can see any obstructions to retractions - you know like the harness or guides or the boom cable fingers, proximity switches or any of those things - report them.

SC Okay.

CAPCOM And that's all we want to know, Ken, other than any other things you might pick up in looking around out there.

SC Okay, do you require any kind of documentation on this?

CAPCOM I guess we'll have to take verbal comment.

SC Okay.

CAPCOM And Ken, we'd like to vent the battery compartment to 1 volt on your meter. Stop it at 1 volt.

SC Okay, well, alrighty. It drops like a stone, I don't know whether we can do that or not. We'll try it.

CAPCOM Give it a try.

SC I got 1.2 on there, you want to press and try for 1?

CAPCOM That's real good, John, we'll hold it right there.

CAPCOM And Ken, the stellar camera's out of film, if you want to use a normal shutdown procedure on the mapping camera.

SC Okay.

CAPCOM 16, Houston. He kind of would like to know if that's the first time you've noticed that back vent or battery compartment pressure above 1.5 volts?

SC John says that when they did the first charges they had to take and vent it but the charges I did I never saw it above 1.5.

CAPCOM Roger, copy. We'll probably be asking you for a check of that here in a little while, just to make sure it's not charging way on up there.

SC Okay, we reported the other times that we vented it.

CAPCOM Roger, John.

CAPCOM And 16 Houston, I'm going off the loop for a couple of minutes, Bill will cover for me.

SC That's not fair.

CAPCOM But it's necessary.

SC Now you understand.

SC How are you doing today, Philip?

CAPCOM Very well today, sir, thank you, and yourself?

SC Oh we're having a ball, just wanted to hear you on the loop.

CAPCOM Well, you've certainly done that, it's another first.

SC Always nice to have a few of those.

CAPCOM 16, Houston, are you going to get to the map here in a little bit.

SC Sure will, thank you.

PAO This is Apollo Control, Houston. That was flight director Phil Shaffer now talking to the - to the crew of Apollo 16. We're at 239 hours, 41 minutes ground elapsed time, and Apollo 16 now 182 904 nautical miles away from the Earth.

END OF TAPE

CAPCOM Apollo 16, Houston. Could you dial in your high gain angles for the thermal attitude.

SC Hank, 16.

CAPCOM Go ahead.

SC Okay, the bat B charge is underway, and we've been watching this battery compartment, and we're back up to 2 now.

CAPCOM Roger, copy.

SC Hank, I really don't know what's going on with our antenna. It's - I get you the best signal strength by going to manual and narrow, and every time we switch to either AUTO or REACK, why it seems to break - break some kind of main switch or lock, or something, and we've tried going to manual and wide and then working in through REACK and then bring it down and things, and that doesn't help any. Would there be any future in trying the secondary electronics, the sensors.

CAPCOM Okay, INCO says we're just right on the line there. Why don't we just leave it in manual and narrow.

SC Okay.

CAPCOM And, Ken. I'd appreciate it in time to time, if you'd just give me a idea of where you are in the checklist.

SC We is at the eat period.

CAPCOM Hey, that's a good plan.

SC We'll be ready to start into that checklist in probably about 10 minutes or so, but it just didn't seem like it was proper to go ahead and press on the rest of the day without stopping for something.

CAPCOM I agree with you, and I guess we'd better terminate that battery B charge and keep an eye on that thing. If it gets above 3, give us a call. And also -

SC Okay, why don't you call us back in about 30 minutes and ask us to look at it, cause that's not the kind of position where we can keep an eye on it without making a conscience effort at it.

CAPCOM Okay, we'll give you a reminder and if it's above 3 or in that neighborhood, we're going to want to vent it again back down to one.

SC Okay, do you want to vent it now, it's 2.

CAPCOM Negative. We want to see if it will stabilize.

SC Okay, you've got the, the batt B charge is terminated, and we'll watch the battery's compartment pressure.

CAPCOM While your eating there, I'll tell you a little local sports news. The Astro's have won 7 in a row now, and they are tied for 1st place in the division.

SC That's outstanding. Congratulations.

CAPCOM 16, if it's convenient, could we get a check a check on the batt C voltage.

SC Okay, it's 36 and a half.

CAPCOM Roger, copy 36.5.

SC Okay, Hank. And John stuck the eye ball right closer to the meter and it's 1.9 instead of 2.

CAPCOM Roger, 1.9.

END OF TAPE

SC Okay, we're going to vent battery -- the back compartment again, and it's two and --

CAPCOM Okay, if you want to try a vent go ahead, and see if you can stop it at one.

SC Okay.

SC What's wrong if we go below one?

CAPCOM Well, the problem is there, Ken, it -- at one volt were -- 1.5 but we're roughly equal to cabin pressure in there and if you go much below one, and we do have a battery that's vented, you could lose the battery if it goes all the way to vacuum.

SC Okay, and that's the only problem?

CAPCOM Roger. In other words, if the battery -- if a battery has vented and the vent doesn't reseal and it's not resealed, if you go to vacuum, the electrolight could go out of it.

SC Roge. I understand that. That's the only problem, though. Is that correct? It won't affect the other batteries?

CAPCOM That's affirmative. They shouldn't affect the other batteries.

SC Okay, thank you. We'll try it for one again. Okay, it's reading 1.2 -- about 1.3, I guess. We'll leave at that for a few minutes.

SC Can you all see the back charger current down there, Hank?

CAPCOM That's affirmative and it's reading zero now, Charlie.

SC Okay. When I started that Bat A charge, I was looking at Bat Bus B and we got a negative amp -- it looked like it could be a negative amps all scale load on Bat D and then, I went to Bat charger but they should -- but it didn't look right to me so I stopped and then I went to Bat Charger and started it and again, and the Bat Charge current went up to about 2 which are -- which were a nominal. The only question was that it looked like the reverse current or something and I guess that's true, isn't it, though if we reverse turn into the battery to charge it?

CAPCOM That's affirmative.

SC Okay, so that's nominal? Okay, thank you.

CAPCOM Okay, Charlie. What we saw down here, I guess, when you started the charge, it looked like that perhaps you hadn't pulled the bat relay circuit breaker then you stopped and then it looked normal to us.

SC Okay, it was open and the breaker is

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SC pulled. Or it's closed now since it's charged it terminated.

CAPCOM And they also saw some (garble) it looked like the charge started out on Bat A and then it went to Bat B.

SC Well, you got to go to the A position to get to B.

CAPCOM Copy.

SC Okay, Hank, we're right -- I'm stowing from 82 at the top of page 3-2 row.

CAPCOM Okay, thank you.

CAPCOM 16, Houston, we got an answer to your question about the rest rings on your suit.

SC Okay, we're not ready for that answer right now, I reckon.

CAPCOM Okay, whenever you're ready. Holler.

SC Okay.

END OF TAPE

SC Hank, on the battery compartment, we vented it back down to 1, and it's back up to about 1 - 1.3 we vented to and it's back up to 1.8 now and seems to be stable on us.

CAPCOM Okay, Charlie, thank you.

SC Okay, Houston, we've got 5900 pounds in the OPS at regulation 3 7.

CAPCOM Roger, copy 5900 pounds regulated to 3.7.

SC We're, Hank we're down to the PD and back prep and we're just before install the meter covers.

CAPCOM Okay, real good John, thank you.

PAO This is Apollo Control, Houston, at 240 hours 38 minutes ground elapsed time. The crew of Apollo 16 presently going through preparations in the cabin for the command module pilot EVA. Our countdown clock in Mission Control going for hatch open time, we show 2 hours and 16 minutes away now and Apollo 16 is presently at a distance of 180 774 nautical miles away from the Earth, velocity now reading 3850 feet per second.

CAPCOM Ken, we'd like to see the turn off of the SIM bay that's on 3-6 before you turn our data off.

SC Okay, understand SIM bay turn off on 3-6 before we turn data off.

CAPCOM Roger, and we'll need that data switch the S-band OX TV switch in sight in order to see the data and we have some additions to that turn off too, whenever you're ready to do some of those, I'll call them out to you.

SC Okay.

CAPCOM Okay, we want the mapping camera OFF, the gamma ray OFF, and we want to verify that the mass spec, even though we don't have it, we want to verify that the mass spec experiment is OFF and the ion source is OFF. Laser altimeter OFF, and image motion OFF. And all of those items are in addition to the ones that are listed on page 3-6.

SC Okay, that's the way they'll go on page 3-6.

CAPCOM Okay.

PAO This is Apollo Control, Houston, at 240 hours 46 minutes, ground elapsed time, very little discussion with the crew of Apollo 16. Since the crew is presently going through preparations for the command module pilot - trip outside the spacecraft. We show Apollo 16 at a distance away from of 180 489 nautical miles, velocity now reads 3 854 feet per second. Continuing to monitor, this is Apollo Control, Houston.

CAPCOM 16, Houston, could you give us a check on the data compartment now?

SC Okay, it's up to 2.0, just a little higher than it was last time.

CAPCOM Roger, 2.0

PAO This is Apollo Control, Houston, at 240 hours 49 minutes ground elapsed time. The discussion we've had with regard to the batteries, we're talking about entry batteries, and exploring the possibility of one of the 3 - we do monitor batteries A and B, but not battery C via telemetry, however, from our discussion here, is centered around data not covered via TM. Each battery has 20 cells, much like a car battery but with check valves rather than caps for each cell. Right now we don't believe that that we have a problem with any one of these cells, but we're exploring that kind of possibility with the pressure built up it would indicate the possibility of one of the cells one of the batteries, could be venting. I repeat we have no reason to believe that right now, but we're exploring that with the crew of Apollo 16. The principle concern does not deal with battery capability, but rather to make sure that battery gas would not be relieving into the cabin. Entry can be safely accomplished on only one of the 3 batteries. We're at 240 hours 51 minutes, we now show Apollo 16 at a distance of 180 309 nautical miles away from the Earth and traveling at a speed of 3857 feet per second.

SC Okay, Hank, we're on the bottom of page 3-4 and we're taking the couches out now.

CAPCOM Roger, copy.

PAO This is Apollo Control, Houston, 241 hours ground elapsed time. That report indicated that the crew of Apollo 16 is now removing the center couch in preparation of - for the EVA. We presently show Apollo 16 at a distance from Earth of 179 956 nautical miles, velocity now reads 8 662 feet per second.

END OF TAPE

CAPCOM 16, Houston. When you get around to prior to suit donning we recomend that you lubricate those wrist rings using the mangus kit that stored in AA. And you might try to work some of that lub in around the locking rings and work the ring several times to try to free them up a little bit -- the locking rings.

SC Okay Hank. We've already done that. We did that when we doffed the suits yesterday as best we could.

CAPCOM Okay.

SC I'm not sure it had much effect, but we did it.

CAPCOM Charlie did you do the full lubing and cleaning, including the zippers, in accordance with the instructions in the EMU mangus kit?

SC Yes sir. Just like we done it on the surface. We did the zippers, all of the O-rings, the neck rings, the wrist rings and it seems to be, Hank, it's really not where the O-ring is, it's in the slide part between the suit part and the locket part of it. It's stiff. You could dust down in there, but you can't get it out too well.

CAPCOM Roger, copy. All that we could recomend there, which I'm sure you've already done, just sock it a few times, see if you can free it up.

SC Okay, thank you. I think that'll be okay.

PAO This is Apollo Control Houston. At 241 hours 8 minutes ground elapsed time. Apollo 16 now 179 663 nautical miles away from the earth. Velocity now reading 38 067 feet per second. The crew of Apollo 16 continuing to press on in preparations for the Command Module Pilot's EVA.

CAPCOM 16, Houston. We'd like to get another read out on the battery compartment and we suggest you leave the meter sitting there so we can read it during the EVA if we have to or you can read it.

SC We'll leave it set. 2.15.

CAPCOM Roger, 2.15.

SC Roger.

PAO This is Apollo Control Houston. At 241 hours 21 minutes ground elapsed time. The Science Staff Support room has just reported that the subsatellite has been activated and it's working fine. The subsatellite in orbit around the Moon. We now show Apollo 16 at 179 143 nautical miles away from the earth and traveling at a speed of 38 075 feet per second.

CAPCOM Apollo 16, Houston. For your information, we just commanded the subsat on and it's alive and well.

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SC Good show. Okay Houston, we're just
about to start with the -- with the SIM bay turn off here
on page 36 and we'll do those additions that you talked
about.

CAPCOM Okay good show.

END OF TAPE

CAPCOM And 16, before you start your suit donning we'd like to vent that battery compartment one more time down to about 1 volt.

SC Okay we'll do that. We're secure in AZ now Houston. On the service module. Okay Houston, we're on page 36 and we're starting our PGA donning right now.

CAPCOM Roger.

SC I think we made up 45 minutes on our late wakeup -- hour late wakeup this morning.

CAPCOM Great. And we're standing by for that battery compartment reading.

PAO This is Apollo Control Houston. At 241 hours 32 minutes ground elapsed time. John Young reporting that the crew of Apollo 16 --

SC 0.

CAPCOM Roger, 1.0.

SC Right.

PAO The crew of Apollo 16 preparing to put on there pressure suits at this time. We show 1 hour 23 minutes of time remaining until time of hatch open. Apollo 16 now at a distance of 178 765 nautical miles and velocity now reads 3881 feet per second.

SC Okay Ken completed donning his suit now and Charlie's going to start on his.

CAPCOM Roger, copy John.

SC Hello Henry. You still there?

CAPCOM Roger Ken. How do you read?

SC Loud and clear.

CAPCOM Okay you're loud and clear.

SC Okay.

PAO This is Apollo Control Houston. At 141 hours 49 minutes ground elapsed time. That was Ken Mattingly calling Hank Hartsfield, our CAPCOM here in Mission Control. Mattingly now scheduled to move outside the spacecraft in 1 hour and 5 minutes. Earlier John Young had reported that Ken Mattingly had completed the donning of his space suit and that Lunar Module Pilot, Charles Duke, was in the process of donning his space suit. We show Apollo 16 at a distance of 178 085 nautical miles away from the earth and traveling at a speed of 3891 feet per second.

SC Hank instead of making this maneuver to the EVA attitude at 2 42, suppose we just leave it -- suit donning.

CAPCOM Roger Ken. You can do that whenever you're ready. When you do do the maneuver we'd like you to go wide on the high gain.

SC Okay.

CAPCOM And Ken in regard to the -- the attitude and angle changes -- the only thing on your EVA cue card there that I saw that required changing was the high gain angle.

SC Okay standby. Standby. Standby please.

SC Okay Hank. Say again what you had to say about the attitudes and angles.

CAPCOM Roger. I read up the new attitudes and high gain angles to Charlie and he was going to change the checklist and the cue card and I just wanted to say that the only place on the cue cards I see that needs a change is the backside of your EVA card, the high gain angles right by the 5018's.

SC Okay I've got that and it was minus 24 and 220 and now we want something different huh?

CAPCOM That's affirmative.

SC Okay now I've got a minus 34 and 218. Shouldn't that track throughout the maneuver? It used to. And the old angles did.

CAPCOM We hope it'll work in AUTO track, Ken, but this is just a precaution. We've been having a little trouble with that high gain.

SC Okay thank you sir. And Hank on that, on that battery thing. It's back up to about 16 now. It came right up to 15, which it -- that -- that means that it's up to 16. Do you want us to vent that thing during the EVA to keep from getting excessive pressure in that chamber, while we have the cabin depressed?

CAPCOM Negative, Ken. We'd like to watch it awhile.

SC Okay that battery compartment will take it when we get the cabin down right? Or at least release through the cabin.

END OF TAPE

CAPCOM That manifold should take 200 PSI, Ken that was what it was qualed at the first pressure 600.

SC Okay, that's fine, you guys think there's a relief valve on one of those batteries that's open?

CAPCOM We're not - we're not sure, we kind of think that maybe what's happening.

SC Okay, do you have any evidence yet as to which battery.

CAPCOM Negative.

SC Okay, thank you.

CAPCOM All of those batteries are manifolded together and all the voltages look normal, if we do drop a cell on one of the batteries, we should be able to pick that up.

SC Rog.

SC Okay, Charlie's suited.

CAPCOM Roger.

PAO This is Apollo Control, Houston at 242 hours ground elapsed time, that was Ken Mattingly reporting that lunar module pilot Charles Duke has suited. We're 54 minutes away now from time of hatch open. We show Apollo 16 at an altitude of 177 691 nautical miles and with a velocity 3 898 feet per second.

CAPCOM 16, Houston, go wide on the high gain.

SC Hank, I just hit the yaw knob, what are the settings and our present attitude?

CAPCOM PITCH minus 14, YAW 58.

SC Okay, we got it.

CAPCOM 16, we'd like to stay WIDE and MANUAL in high gain.

SC Okay, you've got it. Are you going to want that during the EVA or anything?

CAPCOM That's affirmative and we'll call it when we start the maneuver.

SC Okay. WIDE gives you enough margin on the TV? That was really a question, Hank, I didn't mean it as a statement.

CAPCOM Okay, what's going to happen is when we do get in attitude, we can bring it back up into AUTO and get it locked up, we will need a narrow beam.

SC Okay, that's going to be a very difficult thing to try and speak up in a hard suit.

CAPCOM Roger, understand. 16, Houston, we're noticing that the glycol (garble) temp is coming on down and we need to adjust that nichon valve in, but rather than crawl under there and doing that right now, what we want to do is get you to take the temp end switch from MANUAL up to AUTO and we'll give you a call when to put it back into MANUAL and see if that will cut it.

SC Okay is that going to have enough time the way - on your call that's going to - I guess - I guess I'm concerned about making it worse.

CAPCOM Well, the temperature's dropping, we're going to have to adjust it one way or the other, Ken and we're going to lead it.

SC Okay, we can always go back and do it manually if it doesn't work. All right. Do you want to do that - let's do that right now before I maneuver make sure we don't lose comm in the middle of it.

CAPCOM That's right we'd like to do it now.

SC Going to AUTO - mark.

CAPCOM Okay.

CAPCOM Ken, I know this is going to sound funny, but it looks like that nichon valve is working now, it didn't go up like we thought it would.

SC Okay, but we're going to have to make a configuration setting before we start the EVA because we won't be able to get to it then. If we can find a place where it looks good, I'd like to leave it in MANUAL throughout the EVA and we can try the AUTO feature some other time.

CAPCOM Okay, we'd to put the switch back to MANUAL and maneuver to the EVA attitude and we'll take a look when we get good comm there.

SC Okay, temp end switch is in MANUAL and I'm going to the EVA attitude.

CAPCOM Roger.

END OF TAPE

SC Okay, suiting is completed.
CAPCOM Roger, understand, suiting completed.
CAPCOM 16, OMNI DELTA.
SC Hank, we'll be switching comm here again
for a minute.
CAPCOM Okay. 16, if you read OMNI ALPHA.
SC You got it.
CAPCOM Thank you.
CAPCOM OMNI CHARLIE.
CAPCOM Apollo 16, if you read OMNI CHARLIE.
CAPCOM Apollo 16, OMNI CHARLIE.
SC Going OMNI BRAVO now.
CAPCOM Okay, we're reading you again.
SC Roger, loud and clear.
SC Okay, we're down to page 38 on the pressure
gauge static check, we're running through now, Hank.
CAPCOM Okay.
PAO Apollo Control Houston at 242 hours 27
minutes ground elapsed time -
SC Did you acquire with your high gain?
SC Didn't work.
SC Okay, Hank. Had that in wide beam.
CAPCOM Okay, would you go REAC in narrow?
SC Okay, you have it REAC in narrow. Good
signal strength.
CAPCOM Okay, it looks good Charlie.
PAO This is Apollo Control Houston at 242
hours 29 minutes ground elapsed time. The Apollo 16 spacecraft
has now been maneuvered to a proper EVA attitude and we have
acquired with the high gain antenna. We show 25 minutes re-
maining on our countdown clock to time of hatch open, and we
show Apollo 16 at a distance of 176 589 nautical miles away
from the earth and traveling at a speed of 39015 feet per
second. This is Apollo Control Houston.

END OF TAPE

SC I have BOX now. BOX sensitivity is up.
Head comm's off. S-bands TR. AUDIO mode is normal. ER AM's off.
CAPCOM We're reading you, Ken. And for you information
the (garble) setting valve is good.

SC Okay, thank you, sir. Hey, are you going to
check, going to check out the TV. Charlie, did you get that?
Okay, let me see if I got a picture here. Hit you in the head
with this one. You got a - got anything on there yet. You got
a picture. You got the monitor's working isn't it. Bet that'll
help. Okay. Okay. That is the end of it. Get your monitor adjusted
so it shows you what your like. Open it up so you can see some-
thing in side, now close it down before we go outside. Take the
zooms all the way out. Is that alright. Okay. Set this in back
to where it was suppose to be. What's the zoom setting. Alright.
Houston, are you getting a picture.

CAPCOM That's affirmative.

SC Okay. We won't worry about dressing it up
till we get outside.

CAPCOM Okay.

SC Wait a minute John. Let me put this back up.
Watch your hand there.

PAO This is Apollo Control Houston. 242 hours 39
minutes ground elapsed time. Command module pilot Ken Mattingly
now checking out the TV system in preparation for the EVA.

SC TV power off did you say. Okay. And the
cameras back in place. Alright. Okay, we've been doing that.
You might check them. (garble).

SC Okay, Houston. You read me okay on the CDR
loop.

CAPCOM Houston's reading you 5 by 5, John.

SC Okay.

SC Pressure alarm is coming on. I have the warning
tone. It's going back off and the tone is off. You can call VERB 49
and it will already be loaded. Yea, you've got to pro out of this.
Maybe a attitude. Okay. You know it will take 2 pros to be to
meet attitude. Okay. Okay, REPRESS 02 is about 865. No, that
acts as a supplement to SURGE tank. Alright. Okay, let me check
NOUN 351. REPRESS valve is off. That's verified. That's verified.

PAO This is Apollo Control Houston at 242 hours 42
minutes ground elapsed time. Apollo 16 now at a distance of 176,093
nautical miles away from the earth, and traveling at a speed of
3924 feet per second. The integrity checks for the suit still needs
to be completed. We will standby until we have a more definite
time for hatch open and pass that along a soon as it comes available.

SC (garble) you want me to stuff it in my TSP.

SC Yea.

SC I'll tell you what, I'm going to put it up
here just - I don't want to loose this one. Okay, that's flight

SC plan is stowed in R3.
SC Yea, I've got it.
SC Yes, sir. And I have the valves in the open position, and would you verify that that's holding. Counter-clockwise. What does it say on the arrow.

PAO Apollo Control Houston at 242 hours 45 minutes ground elapsed time. Our best estimate for hatch open at this point approximately 40 minutes and the countdown clock in Mission Control being reflected to show that hatch open time.

SC Okay, (garble) out, stowed. Yep. My hoses are disconnected and stowed. Yes sir. Interconnect is in. Heatflow is off, the interconnect is in. It's locked on two sides, and (garble). I have it. Okay. I've got it in low. Okay, it's installed and locked. Nope. That's mine. It's off. Yea. Okay. Okay, I've got the adapter plate on. Yes sir, and I unconnected the, disconnected the OPS hose. There snapped. There installed. Yes, sir. That's attached.

SC It's a little bit easier.

PAO This is Apollo Control Houston, at 242 hours 49 minutes ground elapsed time, Ken Mattingly has just connected the OPS hose with the assistance of lunar module pilot Charles Duke. We show Apollo 16 at a distance of 175,810 nautical miles from earth.

SC (garble) over to the end of, that's it, thank you.

PAO We read a velocity of 3928 feet per second on the spacecraft.

SC PS is installed, the gas connector is installed, and it's locked. Yea, sir. Yep. If you can.

END OF TAPE

SC I have to disconnect this thing to get it down there. Alright, thank you. It'll stay. Yes, that's nice.

SC Oh, I'm sorry, I didn't hear you. Okay, O2 flow is coming on. Mark. I have flow. Yes sir. But would you watch cabin pressure for me? Want me to read those while you do the recheck? Okay, let me get up here. You want me to read those things while you have both hands -

SC Hey, where is the - here's your helmet, where's my laying now? Okay, I'll get it out for you all. Here's yours, John. Those are your gloves, Charlie or - My gloves should be down there to your right somewhere, I think. Yes, just as well get them out of the way. Okay. Alright, thank you.

PAO This is Apollo Control Houston at 242 hours and 53 minutes ground elapsed time. We're about 30 minutes away now from hatch open. It's taking a little bit longer than had originally been anticipated to go through the checklist procedures in getting ready for the Command Module Pilots EVA. We're at 242 hours 54 minutes ground elapsed time. We show Apollo 16 at a distance of 175 657 nautical miles.

SC Okay, around here you mean? That looks clearer in the back, put your head over here a second. That looks clear. That looks good. Yes, that's - the little skirt around the back gets in the way. I didn't hear it click. Want to take the lever off so we can get more pressure on it? Comes on much easier then it comes off. That sounded good. Okay. That about in the center for you? Okay, lock it. That's good. Covered and all buttoned up. Hey, that was easy. Okay, Houston. Charlies donning his helmet and gloves with the converter loop integrity check we're about to get into here for (garble)

CAPCOM Roger, thank you.

SC Hey, that's really nice. Okay, I got 2 locked. That one's locked and your helmet is locked. Got 1 2, gas connectors are locked. Okay. Alright, John. Okay, I'll take the checklist - I'll hold it out of the way for you, that'll be temporary, but as soon as we get the hatch open that wire will get taut. Why don't you loop it under that little dogue by the window frame there. Houston, battery compartments 19, are you happy with that now.

CAPCOM Roger, we're happy with that, Ken.

SC Okay, thank you. Okay, you got your alinements checked? Okay, and the walls are in and they're locked. Okay, both of you checked connections, comm, oxygen and gas connector plugs, all locked? Okay. John, if you'll go to VOX, and let's try the sensitivity, that's probably going to be pretty good. Try it with the ground and see if -

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SC Houston, how do you read me on VOX. Over.
CAPCOM Go ahead.
SC Houston, this is Apollo 16, how do you
read on VOX. Over.
CAPCOM Roger, reading you loud and clear, John.
SC Okay.
SC Okay, and the left - the next thing is
to stow the checklist -

END OF TAPE

MATTINGLY like you do on the cue card. Its on the panel.
YOUNG Maneuver behind the thing.
MATTINGLY Okay, panel 380, the circuit return
valves are closed.
YOUNG Okay. The second return valve to close.
MATTINGLY Yes sir, push in that's it. Okay? Panel
7 directed to CLOSE clockwise.
YOUNG Panel 7 directed to 2.
MATTINGLY Make sure it s closed.
YOUNG It's closed.
MATTINGLY Okay, the suit pressure indicator is reading
5.2 - it's about 5, I'm going to bleed this a little bit. Okay
Houston, I have the equalization valve open a little bit will
you keep an eye on the cabin pressure for us, please.
CAPCOM Roger, and would you vent it down to about
5.1, it's up now.
MATTINGLY Okay, I've got the valve open now, would
you keep an eye on the cabin pressure, please.
CAPCOM Will do.
MATTINGLY Okay, the flow is normal, suit pressure okay.
We're ready to go on suit circuit: (garble) eject. And suit
test valve to press.
YOUNG Suit test valve to press. Going to press.
MATTINGLY Okay, you got it in pressure?
YOUNG In pressure.
MATTINGLY All right, direct O2 tube flow OPEN.
YOUNG Okay, we're open in direct O2 -
MATTINGLY Okay, you're going to start to pressurize
now. Okay you - might give it another PSI and then cycle the
suit circuit return.
YOUNG Okay.
MATTINGLY You have a master alarm, that's high O2
flow.
YOUNG Okay.
MATTINGLY I'll get it off, Charlie.
MATTINGLY I'm putting the caution warning back to normal.
CAPCOM Ken, you're down to 5 PSI in the cabin.
MATTINGLY Okay, and the valve is closed.
YOUNG What's my suit pressure Charlie.
DUKE You're at you show about 1.2 Delta P.
YOUNG What does it say on the guage over there?
DUKE Point 2 Delta P.
YOUNG Okay, (garble).
MATTINGLY Okay, why don't you cycle the suit circuit
return valve?
YOUNG Okay, cycle one.
MATTINGLY Okay, that's good. Vacuum -
YOUNG Vacuum, that's twice -
MATTINGLY Your suit pressure is still only about
1.5, turn that thing up some to get -
YOUNG Yeah, I'll get it up there.

MATTINGLY And Hank, it looks like we're going to be about 10 minutes late on hatch open.
CAPCOM Roger.
MATTINGLY Okay, you should have 2 PSI.
YOUNG Okay, Call it off.
YOUNG Okay, Call it off to me, Charlie.
YOUNG Maybe you ought to shut off the direct O2 Ken.
MATTINGLY About 4.
YOUNG Okay.
MATTINGLY Okay, why don't you turn the direct O2 off?
YOUNG Direct O2 off.
MATTINGLY Okay. Okay it ought to get up to almost 4.5.
PAO This is Apollo Control, Houston at 243 hours
4 minutes ground elapsed time.
MATTINGLY What your suit pressure.
PAO Apollo -
YOUNG (garble) Mark. Mark it.
PAO Apollo 16 now 175 275 nautical miles away
from the Earth.
YOUNG Regulate right there about 4 or 5.
MATTINGLY And the flow should start to drop here.
MATTINGLY How's your suit pressure, stable?
YOUNG Okay, Houston, how long does it take before
the flow starts to drop on this garble - thing?
CAPCOM Stand by, John.
MATTINGLY Get you a little Delta P there, probably help.
MATTINGLY There you go.
YOUNG Coming down.
MATTINGLY That's all it needed, that little bit. Okay
I'm turning my flow off, Mark.
YOUNG Okay I -
MATTINGLY Okay I'm going to check that his flow remains
stable and low.
YOUNG What's considered low, Ken, it's climbing
right back up.
MATTINGLY Less than .97, in other words it doesn't
peg.
YOUNG Oh the rascal, it stopped at .7. Okay the
flow is holding right now at .72 and on me and Charlie, that
ought to do it.
MATTINGLY Okay.
CAPCOM That sounds good, John.
YOUNG (coughing) Now it's up to .8, that's pegged
for some reason it just pegged.
MATTINGLY How about the cyclage accumulator?
YOUNG Just a second. Yeah, that's probably what it
was, 8, 9, 10.
YOUNG Yep, there's the cyclic accumulator, hmm.
Okay.

END OF TAPE

SC There's a cyclic (garble) accumulator.
CAPCOM Okay.
CAPCOM (garble) down here.
CAPCOM Okay. Why don't you go to DEPRESS on
the suit test valve.
SC Okay. Going to DEPRESS.
SC Hey, you'll come down too slow.
SC - come down at all, unless I can find
the valve.
SC There we go.
SC Press DEPRESS.
SC I tell you, it's pretty good for these
old suits to be holding air with all this moon dust in them,
Houston.
CAPCOM Roger, we copy.
PAO That was John Young making that call out.
We're at 243 hours 7 minutes ground elapsed time. We show
Apollo 16 at an altitude of 175 129 nautical miles.
SC Okay. I got my purge valve pin pulled
and my purge valve is activated to low. The diverter valves
are reject into vertical. We get your suits back down and
get the systems stable, we'll go to the EVA card.
CAPCOM Okay.
SC Up to 8 now to come down.
SC No, it's comforting to know that there
is some sunlight out there when we vented the cabins when
the particles went out, you could see the sunlight on them.
Otherwise it's just as black as all get out.
SC Hey, you want to open that black bag
down there and put a vent on it?
SC Let's crack it.
SC Yes.
SC (garble)
SC I can get it. I can get it.
SC Okay. Can you snap it, Charlie?
SC I got bare hands here, I can do that.
SC Okay.
SC Okay. Can you -
SC Snaps all the way in the back.
SC Oh, you did vent it.
SC Wait, I need my helmet.
SC Okay.
SC Are we in this card here?
SC Okay. You back to normal yet?
SC Not quite.
SC That card picks up as soon as I get this
thing back on here - get you back to normal on this -

SC configuration.
SC Now I'm turning my O2 flow back on.
You can keep an eye on the cabin pressure for us, if you please.
CAPCOM Roger. We're up to about 53 to 54 now.
SC Okay. I just turned my flow back on,
so it'll start to rise again.
SC Got about 3/4 of a psi to go. (Garble)
SC Aw, it's no problem.
SC Okay.
PAO This is Apollo Control, Houston, at
243 hours 11 minutes ground elapsed time. Ken Mattingly
now in the process of -
SC I'm going to get a little head start
so I won't get interrupted on our check.
PAO - donning his helmet and gloves at this
time. We show Apollo 16 at a distance of 174 983 nautical
miles.
SC Hey, your equalization valve is closed.
SC All right. We're down now, aren't we?
SC Yes, that's good.
CAPCOM Okay.
SC Okay. Going to suit test valve to On.
SC Dave verified that the (garble) demand.
SC (garble) demand.
SC Okay. I'm going to put the - put this
in the stowage locker (garble) want to turn it around the
other way.
SC Okay.

END OF TAPE

SC Those rings won't quite fit. Probably won't need it during - I'm going to put it right in here, how's that? Okay, John, I'm ready to press on.

SC Okay, (garble) don helmet and lock.

SC Yes sir. Helmet's coming on. Yes.

SC Roger. (garble) this over here.

SC That should have it, you still got a little, wait a minute, you get it? I'll hold it down. That do it?

SC Okay, it's locked.

SC Okay, I verify that.

SC And these stripes ought to line up pretty good, do they?

SC Hey, your one stripe to the, you got to come this way, the other way. Whoa, too much. There you go, perfect.

SC Get the thermal stuff down there, Charlie. That's good. Okay.

SC Okay, don wrist tether, ring forward.

SC I got it on my glove.

SC Don leva, that's done, verify alinement, don the comfort gloves.

SC Okay.

SC Don one glove and lock. Okay, following that panel 603 EVA 02 OFF and don the other glove and lock it.

SC Okay. Alright, thank you.

CAPCOM 16, Houston. Like to get a voice check with Charlie.

SC Talk to them, Charlie.

SC I'm reading everybody, Hank. How me?

CAPCOM Okay, reading you 5 by 5.

SC Okay, I've got the other glove on and locked.

SC Okay, alright, keep panel EVA 02 ON. Let me verify those locks again.

SC Alright, sir.

SC Okay, okay, verified.

SC Okay. how are they going, Charlie?

SC Thank you sir.

SC Okay, here comes the right I'll turn it off. My flow is off, the glove is coming on. And that looks locked.

SC It's locked.

SC Okay, the flow is coming back on. Next.

SC Modulate on and off as required to pressurize the CMP.

SC Okay, we're coming up.

SC Cuff gauge 3 7 to 40. And then you should get
the panel 604s suit pressure alarm on.

SC Okay, I'll turn the switch on.

SC Yeah.

SC I have a tone at this time.

SC Verify the tone's off.

SC Yeah, tone will come off when the pressure
comes up.

SC Right.

SC How am I doing on the instrument panel, Charlie?

SC Fine.

SC Okay.

PAO Apollo Control, Houston, at 243 hours 17 min-
utes ground elapsed time. Our best estimate now we're about 5
minutes away now from go no go for depress.

SC The tone goes off at 3.2 and climbing.

SC Okay, fine.

SC Okay, on panel 10 adjust the CMP master
volumn, if required.

SC I can hear you guys just fine. Yeah, it's
perfect, great.

SC LMP panel 351 emergency cabin pressure to OFF.

SC How's that cabin pressure doing I wonder.

SC I don't know, Houston has the cabin --

SC Roger, it's 5.6.

SC Okay, we'll make it.

SC Vertical is OFF. Vertically down is
off isn't it?

SC Okay, don't I do a suit integrity check,
Charlie.

SC Yeah. I'm sorry I didn't turn the flow
off. Okay, my flow is coming off. Nope, it's going up the
guard there.

SC Wait a minute you've got to do the EVA 1
and tone check first.

SC Okay, 3 minutes left.

SC CMP monitor the cuff gage set the purge
valve to high.

END OF TAPE

SC CMP monitor cuff guage, set the PURGE valve
to HIGH.
SC Let me do that for you.
SC And verify the EVA -
SC Okay, it's HIGH.
SC Okay, verify the EVA tone comes on at 31
to 34.
SC Comes on at 32.
SC Comes on at 32, okay. That PURGE valve to
closed.
SC Okay, I'm going to have to have some, I've got
this PURGE valve stuffed in my pocket cause it came out of that
container.
SC Right.
SC Going to have to get the soft suit to get it.
CAPCOM Ken, your cabins up to 5.8. We suggest -
SC (garble)
SC Okay, that's going to vent. Okay you're at
vent.
CAPCOM Roger.
SC (garble) We've got to push it in
first.
SC Oh yea.
SC I tell you what. Put it in to low first and
let me build up my pressure slow.
SC That went low.
SC Yea.
SC (garble)
CAPCOM Okay, Ken. Would you close -
SC Now you can close it.
CAPCOM Side hatch dump.
SC Okay, thank you, Houston.
SC Okay, it's closed.
SC Okay.
SC Okay, you pins in, Ken.
SC Okay, is it set on high flow.
SC Okay, going back to high.
SC High flow is counterclockwise.
SC Okay, it's on high flow.
SC Master alarm four.
SC 2 flow high.
SC Okay, maybe I- how low is the cabin.
SC No, I can't see the cabin pressure.
CAPCOM We're at 4.7.
SC 4.7.
SC Okay, that's why you got the high O2 flow.
SC Why.
SC Your cabin's at 4.7 I vented the cabin,
below where the rates go.
CAPCOM Roger, we verify cabin reg.
SC Shut off.

SC You've got the emergency reg shut off.
 Okay, you don't have the main reg shut off because they're
 suppose to switch on.

SC Okay. Okay, well, let's press on. Integrity
 check. Panel 603 EVA O2 to off.

SC Okay. There we go.

SC Okay. Can you see what I'm hung up on, Charlie.

SC Okay, thank you.

SC Monitor cuff gage to verify TCV closes.

SC Okay.

SC Monitor pressure decay for 1 minute.
 Verify that at less than 8 tenths.

SC TN's, I've got the tones.

SC Okay, there's a mark on a minute.

SC Falling, it started at 365, and slowly coming
 down. Okay, can you hear a cross feed on it.

SC Okay, I'll turn the oxygen back on.

SC Okay, Ken, That was - what was it? It looked
 pretty good right now.

SC Huh?

SC How much was it?

SC 3.6.

SC Okay, fine. You got a tight suit.

SC On is on?

SC I mean the guage oxygen panel 603 is on and the
 guard is down.

SC Call the Guard.

SC It's down and locked.

SC Verify PGA pressure, 37 to 40. Verify tone
 is off.

SC Tone is off and I have 3.9.

SC Houston?

SC That makes me sick. That (garbled)

SC Okay, EVA station pressure guage 100 to
 500 psi.

SC Say, it's 1 2.

PAO Apollo Control Houston. We're GO for cabin
 depress. Standing by.

SC Surge Tank pressure greater than 750.

CAPCOM Apollo 16, you're GO for cabin depress.

SC Okay.

SC The surge tank is reading 860.

SC Okay, GO for depress.

SC (garble) 2 value handles full.

SC Okay, (garbled) are full.

SC Guage minimum, leave in that position.

SC say, again.

SC Guage to minimum. Leave in that position.

SC Okay, the guage is minimum and it is in
 vent. Verify it.

END OF TAPE

CAPCOM (garble).
CASPER Verify helmet and gloves locked.
MATTINGLY Okay I got two gloves that are locked you
checked my helmet.
CASPER Right.
MATTINGLY Okay.
CASPER Confirm go for depress from Houston.
MATTINGLY We got that I think.
CASPER EVA warnings may come on momentarily during
depress side hatch dump valve to OPEN don't pull too hard, warning
light may come on before cabin pressure ready to lock up.
Close the dump valve to 3.25, can you see that Ken?
MATTINGLY I'll close it and see how we're doing.
CASPER Houston, can you give us a call at 3:25?
CAPCOM Will do.
CASPER Are you ready?
MATTINGLY All set.
CASPER Okay, equalization valve coming open.
MATTINGLY Okay, coming down through 4.5.
PAO Cabin pressure now reads 3.8.
MATTINGLY We may get a jettison before we get the cameras
through. There going through about 3.5.
CAPCOM Roger 3.-
CASPER 3:25.
CAPCOM 3.2 -
CASPER Okay, equalization valve is closed.
PAO Cabin pressure now reads 3.
CASPER It's less than a half, it is it's reading
wait a second, let it stabilize here, got another accumulator
cycle.
CAPCOM Accumulator cycle, we confirm.
CASPER Okay cabins down now.
CASPER Okay, that's great, go ahead and -
MATTINGLY Ready to go?
CASPER Yeah.
MATTINGLY Okay, cabin's coming down.
CASPER Okay.
PAO Cabin pressure now 2.6.
CASPER Okay, it shows 2.5. Want to get that one
in there.
PAO Cabin pressure now 2.1 PSI.
MATTINGLY Cabin pressure is 2.0 and fixing to get mark.
off the peg pretty soon.
PAO Cabin pressure now 1.4.
MATTINGLY Okay, I'm showing 1.3.
CASPER Okay.
PAO We read cabin pressure at 1 PSI at this time.
MATTINGLY Cabin shows about one, I'm going to open it a
little more, that can help it.
CASPER How do you feel now Ken.
MATTINGLY I'm fine. It's a lot better when you get

APOLLO 15 MISSION COMMENTARY 4/25/72 14:32 CST 243:24 GET 797/2

MATTINGLY the cabin depressurized.

END OF TAPE

MATTINGLY I'm still showing about 3/4.
 CASPER Don't let that screw go in there, Ken.
 MATTINGLY Oh that's right.
 CASPER Did it go in?
 MATTINGLY It looks like it went in here, I can't
 tell.
 CASPER Okay, looks like we're down pretty low.
 CASPER Okay, verify suit pressure stable, 3.5 to
 4.0.
 MATTINGLY My pressure is steady and 3.75.
 CASPER Okay, verify (garble) is closed, that's
 verified. How's your cuff guage, Charlie?
 CASPER Okay mine too. EVA station pressure
 guage 100 to 500 no tone.
 MATTINGLY Okay, still setting on 300 and no warning tone.
 CASPER Okay, panel 3 S-band AUX TV to TV.
 MATTINGLY Okay.
 CASPER I'm going to intercom PTT.
 MATTINGLY Oh let's see I'm not sure the cabin
 is really down out of that, (garble) region. How about
 reading me that stuff again when I get the hatch.
 CASPER It doesn't matter right now.
 MATTINGLY Okay, if you can get it on, fine, if
 not don't worry about it.
 CASPER Okay.
 MATTINGLY I can't read the paralaxer guage, it
 looks like it must be just about down though.
 CASPER Okay, well lets ask the ground. Houston
 what do you show the cabin pressure.
 CAPCOM Roger, we're showing you .1.
 MATTINGLY That ought to be enough, huh?
 CASPER Okay, yeah that's enough, Okay, I'm
 going to intercom PTT.
 MATTINGLY And Houston, is that low enough pressure
 to turn the TV on?
 MATTINGLY Henry did you read -
 CAPCOM Roger, we copy, press on with the -
 turning it on.
 MATTINGLY Okay, thank you sir.
 MATTINGLY You have TV on.
 MATTINGLY Okay it's unlatched.
 CASPER Unlatched. (garble) Okay?
 PAO Standing by now for hatch opening at
 243 hours 34 minutes, ground elapsed time.
 MATTINGLY Okay, what do I do now, I've put the handle
 up? Okay it's on L, it's stowed (garble) It's stowed, how
 about the gear box. Okay, gear box is to latch. Okay my
 head visor is down. Okay.

END OF TAPE

PAO Crew of Apollo 16 now going through procedures for hatch opening.

SC How about if I get rid of the jet bag first.

SC Okay, yep yep. I'm on a bag.

SC Okay, I'll go out and get the TV.

PAO That's Ken Mattingly reporting that he has jettisoned to the jet bag. The hatch now open. He's going out to install the TV and the data acquisition camera. We'll stand by.

SC Charlie, you'll need the outer visor as soon as you get to the hatch.

SC Okay. Okay. Use your visor shade, too looking out. How's that? Oh just neat (laughter).

SC Sorry, about that. Okay, there's the camera. Yeah, I've got to get my umbilical up here first off.

CAPCOM Charlie, could you check and see if the glycol mixing valve got bumped into auto, the temp in.

SC John, you can check that.

SC It's in manual.

CAPCOM Roger, copy manual.

SC Yeah, the glycol evaporator temp in is in manual.

SC Charlie, I'm hung up on some cable there.

SC There it is.

PAO This is Apollo control Houston. We show Apollo 16 at 173 961 nautical miles.

SC Rog, I will when I get here. Looks like it's hung up on something there.

CAPCOM 16, if you'll take the temp in switch to auto, please.

SC Okay.

CAPCOM Okay, back to manual on the temp in.

SC I need some more cable there, Charlie.

SC Yep. (Garble).

CAPCOM Roger, would you verify your in manual in temp in.

SC Yeah, that's affirm.

SC Charlie, I'm going to have to back in and get a little better grip. WE've got to turn this pole around. Get my foot on something. Okay, thank you. Now Let me see if I can ...

END OF TAPE

CASPER Let me see if I can (garble) panel 16 power ON. Okay, I can feel it. How are the photos of the SIM Bay? Does it -- do I need to adjust it? Houston, is that picture okay?

CAPCOM Looks pretty good down here, Ken.

CASPER Alright, I'm going back to the SIM Bay.

PAO Ken Mattingly now moving toward the SIM Bay to secure himself in foot restraints when he gets there.

MATTINGLY Okay. Are you ready Charlie?

CASPER Yeah, on your egress you sure will.

MATTINGLY All set. (garble)

CAPCOM Charlie, can you verify the TV (garble)?

CASPER Did the picture shift? Are you not getting a good picture, Hank?

CAPCOM It looks like it might be swung a little too far to the left. We're not sure. That would be to Charlie's left.

MATTINGLY Okay, I'll fix that in a minute. Alright, okay, standby. No, we can't put it there without moving the door. Let's get this stuff. Number 1, I'm at the mapping camera, and the stellar cover door is open, and the stellar cover is jammed out, and jammed against the handrail. Copy, Hank?

CAPCOM Roger, copy.

CASPER I am. Yeah.

MATTINGLY Oh, man! Man, the ol' Moon's out there. Okay, going after the pan camera. Okay, here comes the hard cover -- gone!

PAO Ken Mattingly will first receive -- retrieve the pan camera cassette --

MATTINGLY (garble) cover is gone! Okay, I'm going after the hook.

CASPER Okay, good.

PAO He will return this to the hatch, and Lunar Module pilot, Charles Duke, will attach a tether --

MATTINGLY Boy, that ol' visor of yours -- that outer visor on the glare shield really comes in handy.

PAO Duke will attach a tether, a large hook to the cassette and lock.

MATTINGLY Okay, the (garble) is out, and I'm throwing it away.

PAO He will now squeeze the handle and remove the cassette.

MATTINGLY Oh, they'll open not much I bet. Not at all, there it is, it's out.

END OF TAPE

MATTINGLY Not at all. There it is. It's out.
PAO Mattingly reports he's got the cassette.
The pan camera cassette weighs 72 pounds and one G. It'll now
be returned or transferred to the hatch.
MATTINGLY Okay, get my feet out. There's one. There's
two.
PAO He was taking his feet out from the restraint
MATTINGLY Okay.
PAO You now see the cassette being returned to
Lunar Module Pilot Charlie Duke.
PAO Apollo 16 now 173 669 nautical miles away
from the Earth.
MATTINGLY Alright.
PAO The cassette will be stowed on the lunar
module pilots couch.
MATTINGLY It is in alright. I don't even see any
stars.
MATTINGLY And, Charlie, will you hook that back to my
ring?
MATTINGLY You don't need to lock it.
MATTINGLY Okay, going back for the mapper.
PAO Ken Mattingly now returning for the map
camera cassette.
MATTINGLY The mapper is still out here. I bet'cha
MATTINGLY Oh, man.
MATTINGLY Alrighty. I got my feet well locked and I
got a good suit pressure and cooling is just fine. Let me tell
you a few things about the old SIM bay.
MATTINGLY Okay. First thing that's real obvious to you
out here, is the amount of bubbling on the service module paint. It
is a bit more than I anticipated seeing and the radiator panel
down to the right side of the SIM bay looks nice and clean. No
bubbles on the paint or anything like that.
MATTINGLY The area right under the quad - I'm going go
raise my visor to see - Yeah, I got the inner one still down.
I will.
MATTINGLY Yeah, you don't need to remind me of that
one.
MATTINGLY Okay, the area directly under the Quad
doesn't look to me like it's blistered any more than the areas
anywhere else around here. That's just a qualitative comment.
The, in fact the paint on the Quad itself is as blistered. The
area directly under the nozzle on the plus Z jet on Quad B is
all blistered. I can see that in the sun. I can't tell about
the other surfaces.

END OF TAPE

MATTINGLY is all blistered, I can see that but I can't tell about the other surfaces. Okay looking now at the mapping, at the mass spec and the gamma ray, I am going to have to move out and do that (garble).

CAPCOM Ken, I'd like to caution you on mass spec to steer clear of that door there, it's very soft and it could bend and break and leave a jagged edge.

MATTINGLY Rog, I won't touch it.

PAO This is Ken Mattingly providing a narrative of what he's seen during his rest period prior to retrieving the mapping camera cassette -

MATTINGLY Okay, I've got a good hand hold over here on the pan camera, rail so that's a good one and now I'm over the gamma ray door and it's about open at, say 30 degrees. And I can't - I can nudge it and looks like it's hitting on the top of the gamma ray spectrometer itself. Now it isn't, it's not touching the spectrometer. And I'm not real sure what it is jammed on. I can't see anything anywhere. The cover just feels like it's a little bit loose at about a 30 degrees jiggle and I can't see the mechanism to tell whether it's broken. The -

CAPCOM Ken, can you see if the guard rails come through the SIM?

MATTINGLY Ah, let me take a look; I don't think I can get my head over there far enough to tell that. Yes they do, they come right up to the pointed edge.

CAPCOM Roger, copy.

MATTINGLY Okay, and on the mass spec, there's nothing there but the door wide open. Was there something in particular you'd like to be looked at back here? On the mass spec.

CAPCOM Negative.

MATTINGLY Okay, anything else on the aft end? I don't see any blistering of paint or anything, it's all clean in the aft shell.

CAPCOM Okay, copy.

PAO Two hundred and 43 hours, 52 minutes ground elapsed time. Sixteen now at a distance of 173 406 nautical miles.

MATTINGLY All right, thank you, Charlie. Now, I'll put my feet in here and we'll take a look at the old mapper. Okay, while I'm standing on top of the DAC camera, the B over 8 fender, looks perfectly clean, there's nothing on the sensors, I see no evidence of contamination on the sensor, either the - the light meter or the D over H, the barrel is clean, all the decks and surfaces of the pan camera installation are clean.

CAPCOM Very good, Ken.

PAO Ken Mattingly now securing himself with his foot restraints. Preparing to retrieve the mapping camera cassette. The -

MATTINGLY Okay, here comes the mapping camera cover, hard cover. The soft cover. Next. That's my wrist setter. Okay.

PAO The mapping camera cassette weighs 20 pounds in 1 G, it will be passed along in much the same way as the pan camera was, attached to a -

MATTINGLY Okay, I'm putting the tether on now, John.

PAO - attached to the commanders tether large hook, to the cassette, it's locked and

END OF TAPE

PAO ... and then stored whats returned to
the cabin.
SC I'm having trouble with this hook. If
I can get it on I'll get it locked.
PAO 243 hours 56 minutes ground elapsed time.
Apollo 16 now 173 275 nautical miles away.
SC Oh yeah, I can tell you fellows had voice
all the way a little stiffer than the. Hey, it's on. Okay.
SC Hey, why don't you wait until I get to
the hatch.
SC I see them. Yes sir. Yes sir.
PAO The mapping cassette now being passed
inside.
SC If you get it hooked on you can pull
the tether off my hand there, Charlie.
PAO Ken Mattingly will next rest in the hatch.
SC No sir. Ken, how we doing on umbilical
now. How we doing on umbilical you got most of it inside.
Okay. Go ahead.
SC Yes, after Charlie gets, in.
SC Hey, let's go on back to the, let's see,
okay, yeah, yeah. Turn around here and get my feet.

END OF TAPE

MATTINGLY Turn on the air and get my feet in.
MATTINGLY Okay, wait a minute. See if I can find a
place to put my feet here. Is that a safe place for my right
foot? Okay. Here you go. Got anything on the T.V.?
CAPCOM (garble) Yeah, we got something there.
MATTINGLY Yeah, I'm not very steady here.
CAPCOM Looks like the old Moon.
PAO That's Ken Mattingly pointing the camera towards
the Moon. He will then store the T.V. and the data acquisition
camera under a couch before unstowing the meed experiment. Ken
Mattingly will then move inside and the spacecraft will be re-
positioned for attitude for the experiment.
MATTINGLY Sounds just like Ken to Charlie. Alright.
MATTINGLY Okay, go ahead. Get my umbilical down here.
Yes sir. Okay, Houston, we're maneuvering to the meed attitude.
CAPCOM Roger.
MATTINGLY Got to move my feet. (garble)
PAO MEED is an acronym for Microbial Ecology
Evaluation Device.
MATTINGLY All you got to do is pull the --
SC Okay.
MATTINGLY I got the pole. Okay. Okay, let me pull
this rail out, to hold on to. And we'll play ride'em cowboy.
Is there a number on the way, Charlie?
SC Okay. How's that?
PAO The MEED container, with some 60 million
bacteria will be opened and pointed towards the sun for a 10
minute test period. Then capped and returned to Earth for
analysis.
MATTINGLY Okay. It's in there too far. Charlie is going
to stow it. Okay. Alright, coming. No I got it here. I
think. In here you can't either? Okay, alright, okay. Okay
I got to come in to turn around, then. Hold this pole till
I get out.

END OF TAPE

MATTINGLY I've got to come in to turn around. Help hold this pole 'til I get out. If you let John hold it, then I won't have -- it'll be easier to --

DUKE Okay. The visor bags out --

MATTINGLY (garble) How's that.

PAO Ken Mattingly back inside the spacecraft in the process of unstowing the Meed experiment.

CASPER Now, I've got the Earth peeking over the side of the fuselage, just a little crescent. Okay, coming in.

PAO We now show Apollo 16 at 172 866 nautical miles away from the Earth. Mission Control verifies the spacecraft is in proper attitude for the Meed experiment, pointing toward the Sun.

CASPER Yeah, okay, I got that (garble)

CASPER Okay, Houston, we have reached the Meed attitude.

CAPCOM Roger.

CASPER Okay. It's locked! Of course, we got it! Okay, out with the Meed!

CASPER (garble)

PAO The Meed --

CASPER I've got this visor stuck down and can't see what it is. Got a lot of dirt on it.

PAO The Meed container with some 60 000 000 bacteria will be opened and pointed toward the Sun for a 10 minute period.

CASPER Okay, I got to rotate this 100 degrees. You got both my feet there? Okay. Okay, alright, let go of my feet, get up here to attitude, -- my foot there, (garble) Let's see Charlie, ah -- Alright, just a second. Oh, that's just what we didn't think about. That Velcro strip lays right in front. Yep, hang on, I've got my scissors right here. I'll be right with you. Okay, okay, okay. Okay, what we do need to do, is to pitch up, minimum impulse Oh, you've got to go about 3 degrees.

END OF TAPE

MATTINGLY Put it - put it in yet. Okay go, pitch down then. Yeah.

MATTINGLY Up should be in the right direction on this thing. I set up the first time and that looked like it went the wrong way. Oh, okay, well you need to go up about 3 degrees then.

MATTINGLY I can't tell that your moving. Has the attitude changed? Yeah, it's moving now. Moving in the right direction. Let it ride at the slow rate for about another minute. What's that - oh is that right (laughter). Boy, hows that for luck.

MATTINGLY Okay, John we got another 30 seconds to drift and we'll be there. Yes sir. Yeah.

PAO The Meed container will be installed on a pole verified lock and the command module pilot, Ken Mattingly will install a pole and a hatch bracket. He will verify the experiment alignment with the sunlight correct if required. Activate the experiment and give a mark, give further marks at 9 minutes 30 seconds, 9 minutes 50 seconds when 10 minutes elapse give a mark.

MATTINGLY Go to auto.

PAO Close the experiment and turn the lock 90 degrees counterclockwise.

MATTINGLY Stand by.

MATTINGLY Hey can you hold my feet?

MATTINGLY There it is.

MATTINGLY Okay, pull me in. I'll pull myself in.

CAPCOM Is the Meed open now, Ken?

MATTINGLY Yes sir.

CAPCOM Okay, I didn't get your mark.

MATTINGLY It's been open 15 or 20 now. Sorry.

SC Okay, it's been open 22 seconds now.

PAO 244 hours and 15 minutes ground elapsed time. Apollo 16 now 172 525 nautical miles away.

SC What kind of pressure do you have now?

END OF TAPE

SC Another suit case.
SC Okay.
SC Ah, very comfortable.
SC 3.85. Like a champ.
CAPCOM John, could you give us a cuff guage reading.
SC Okay, I got 3.85, Hank.
CAPCOM Roger. Could we get one from John and Charlie?
SC Do you want all of them or just mine?
SC Okay, ah, say again what you said, John.
SC John has 3 55.
CAPCOM John has 3.55 5, roger.
SC Charlie has 3.95.
CAPCOM 3.95.
SC Probably getting some off the bulkheads to,
drying that place out.
SC Hey, how's the time coming?
SC Okay.
SC How do you turn the lights?
SC Houston, you are now witnessing one of the
longest 10 minute periods in history.
CAPCOM Roger.
SC (laughing) Yeah, I think that one was larger.
SC I'm looking at our dust nozzles out here.
And there is very little build up on the waste dump.
SC (laughing) I don't plan to have that.
SC Okay.
PAO Ken Mattingly still working with the Meade
experiment.
SC Hey, don't you want to know about the SIM?
CAPCOM Roger. When you ran the mapping camera did
you happen to notice the condition of the table that lays be-
tween it and the bulkhead there?
SC I couldn't see down in there. It's only
shadow.
CAPCOM Roger, copy. And on the Stella Camera door,
how far out was it?
SC Oh, I'd say the last folding lip is up
against the hand rail. Well, it's - just about that far.
CAPCOM Roger.
SC Alright, thank you.
SC Ah, I'm just fine. I got nothing to do but just
loop my finger around this thing.
SC No sir.
SC Right.
SC Fine.
SC (laughing) I wish you wouldn't put it that
way.

END OF TAPE

MATTINGLY No wonder that was such a long time. Hank we got another one of those event timers that timed somephase other than universal time.

CAPCOM Say again.

MATTINGLY But don't worry about the MEED we got a watch on it.

CAPCOM Okay, I'm timing it down here too.

MATTINGLY Okay, we got regular watches on it so it's okay. Why don't you check it they are 8 minutes, Hank?

CAPCOM Will do. Coming up on 8 minutes. Mark.

MATTINGLY Okay, thank you, Hank, we're right with you. You get a good look at the Earth, Charlie?

MATTINGLY I'm really surprised I don't see any stars.

MATTINGLY What the heck is it?

MATTINGLY Okay, I'm going --

PAO After Ken Mattingly completes the experiment. He will remove the pole and stow under the commanders couch.

CAPCOM Got about 30 seconds, Ken.

MATTINGLY Okay, I'm on my way to the experiment. Charlie, can you hold my feet there, and would somebody give me a call at 10? Man that spikes right on.

CAPCOM 10 seconds.

MATTINGLY Okay. We're counting down the last minute. (garble)

CAPCOM Okay, make sure it's closed and locked, Ken.

MATTINGLY It's closed, I'm working on the lock.

PAO The lock is turned 90 degrees counter clockwise.

MATTINGLY Charlie, can you hold my feet real good there?

MATTINGLY Hold both of the.

SC Okay.

PAO After removing the pole and stowing it under the couch, Ken Mattingly, will return to the spacecraft.

MATTINGLY Well I didn't get it locked. Yeah, I'm working on that now. I got to compress (garble) after I get the levers on it.

PAO We now show Apollo 16 172,122 nautical miles away at a ground elapsed time of 244 hours 26 minutes.

END OF TAPE

PAO -- 172 122 nautical miles away at a ground elapsed time of 244 hours 26 minutes.

SC Wait a minute. Well, No.

SPEAKER Hey, I wrote it wrong. The time for which they undocked instead of (garble) that I changed. But hey Harold --

CAPCOM Ken, you having any luck with that lock yet.

MATTINGLY Not yet.

CAPCOM Okay, that goes clockwise and then close it, and then counter-clockwise.

MATTINGLY Yes, sir, I've got the big one. It's the lock I don't have.

SC How about if we bring it in and tape it closed?

MATTINGLY I'm gonna do it in just a second, if I don't get it on this try. Well, hey there we go, I think, let me try that now. I feel it coming. Well, I'm going to have to let it have a little extra UV. read. Cause I can't hold it shut and bring it in. Charlie you got my foot?

CAPCOM Ken, do you intend to use the TV anymore?

MATTINGLY No sir. Okay, I've got to get that thing closed, yet, at least out of the UV. Okay I've got it, hey, hook it was open for about 3 seconds.

CAPCOM Roger.

MATTINGLY You got it?

MATTINGLY All right.

MATTINGLY Let me get my hand out of here, that's what's holding it up, now you can pull it in. Wrap a piece of that tether around it until we get the cabin pressurized. You got it? Okay. You can probably stick the whole thing under there. Take your time and get it all cleaned up. All righty.

END OF TAPE

MATTINGLY I see a piece of tether coming up yours is that the MEED Okay. Yeah, don't distract the Lanyard. Okay, I'll turn her on, and start (laughter) Rub-a-dub-dub! Okay, you got my umbilical in sight?

PAO That was Ken Mattingly saying "rub-a-dub-dub" as he prepares to reenter the spacecraft.

MATTINGLY Okay. Let me get my -- I've got to get -- something under my foot there. Okay, I just get my foot low in order to get in. Want me to go back out? Hey, okay, swing Uh, not quite. Get this thing up where I can see something. Look at that! Get the -- John, you sure have a lousy LEVA. It's closed and the hatch is clear.

PAO This is Apollo Control Houston, standing by now for confirmation to see if Ken Mattingly is back in.

SC Okay, alright. Before I take it any further let me try and catch some of those latch seals. (garble) You're right, can you see (garble)? I can't see the top. Can you see the top, John? I just want to make sure I don't have something stuck -- a lanyard stuck in there somewhere. Okay? Yeah. Hey, the arrow indicator looks latched. Yes sir.

PAO The crew of Apollo 16 going through their hatch closing procedures now. Ken Mattingly apparently back inside the spacecraft.

CAPCOM Mattingly, we would like for you to verify that the switch on the TV is in standby, and that the S-band AUX TV is off.

SC Okay. What's the next step on the latches, I think you read one I did miss. And on visual. It's latched. Okay, let me I can get that TV switch. Hay okay. Big help. The switch is off. TThat's affirmative. Oh, and the -- I can't find that. Wasn't on the checklist. Yes you do, right up there.

END OF TAPE

SC Wasn't on the checklist.
 SC Yes you do, right up there. I'm trying to get the visor up so I can see. No, I'm going to use this hatch right here. I can read through this thing. Beg your pardon, it's right there.
 SC Okay, pump valve coming close.
 PAO Standing by now for repressurization of the cabin.
 SC Okay the pressure equalization valve is closed.
 SC Okay, watch this. I'll just sort of hit it once and see how it works.
 SC Okay, Houston can you call us at a cabin pressure of one.
 CAPCOM Will do.
 SC I'll get it. Say again.
 CAPCOM Roger, we'll give you a call at 1 PSI.
 SC Okay, we're repressing now. I show not quite one on the gauge.
 SC Okay, Henry we're showing almost 1 on our gauge and we'll letting it watch for a minute or so.
 CAPCOM Roger, we're showing .5 down here.
 PAO Cabin pressure coming up.
 SC (Garble) cabin check isn't it?
 CAPCOM .5 now. That's affirmative.
 SC He says it's .6. Okay what time - what do we have a minute here 3 minutes, 30 seconds, okay.
 SC Looks closed to me. Okay, Houston, we're content with that check.
 CAPCOM Looks pretty good from down here.
 SC Repress circuits coming on - show open.
 SC I am. Nigh unto there.
 PAO Cabin pressure now reading 1.4 psi.
 SC Just a second.
 PAO Pressure now reading 1.8.
 SC Cabin pressure I show 2. - oh about 2.0.
 CAPCOM Roger, we're showing 1.9.
 SC Okay.
 CAPCOM 2.0 now.
 SC Okay, it's close. You can, how you doing that? (laughter) oh you rolled over - oh I see. I was going to say you got pretty good peripheral vision if you can see around the corner that way.
 SC (Laughter) 1 265.
 SC (Laughter) yeah.
 SC All right, sir we've got about 2 four looks like. Yeah.
 SC Sure is. 85. It's five inches wide.

END OF TAPE

SC It's 5 inches wide.
SC Charlie?
SC Doesn't seem like it does it?
SC I guess that depends on your point of view,
huh?
PAO Apollo Control, Houston, we show Apollo 16
now at a distance of 171,399 nautical miles.
SC I'm going to go with (garble). And it's
putting out an awful lot compared to this big volume.
SC And the umbilical is bringing it up slowly,
Houston, but it looks normal.
CAPCOM Ken, is it convenient for somebody to start
a VERB 49 to the thermal attitude?
SC Yes, sir. If you can read it to us, we
don't have any books out here or anything.
CAPCOM Okay, your NOUN 22 is 175, 283 340. And
we want to change the DAP first, VERB 48 will be -- and if you
can get to it, enable all the jets.
SC You want me to move, John?
SC No. (garble)
SC Oh, okay.
SC What do you want on the DAP Houston?
CAPCOM Okay, after enabling all jets we want
11101 and then all ones.
SC AC. Okay, leave the BC roll jets off.
Just means enable a couple. Yes sir. Turn the AC roll on,
okay and all of the PITCH and YAW push the 3 maybe or 4 maybe
circuit breakers back in. Okay. Okay, you're in business. You
have the auto coil. Hank, say again those numbers for the at-
titude?
CAPCOM Okay, R-1 is 175 00 plus 283 00 plus 340 00
and would you check jet Charlie 1 ON.
PAO Apollo Control, Houston, we show cabin
pressure now at 2.8 PSI, when it reaches 3 PSI we will dump
the OPS bottle and the pressure rise will be quite rapid.
SC Well I don't think we've got quite that
yet. Hey, Houston, I don't know what that problem we had with
the glycol and map temp was, but there was a lot of ice crystals
coming off from that side of the cockpit. And maybe it was affecting
some of the sensors over underneath that region which are pro-
bably covered with condensation. Roll over so John can
get to my cord now.
CAPCOM Roger, that may have been it, John.
SC Look at that, I did it.
PAO Cabin pressure now reading 2.9 PSI.
SC When I get off vox I'll tell you. Okay,
why don't you do something to my suit so I can get depressurized
there?
CAPCOM Roger, Ken, we're showing you at 3 PSI now.
SC Okay, thank you. Read the card there. Well
I think we're going to pump the cabin up with it, Charlie. Just
read the -- Yep.

END OF TAPE

SC (garble).
SC Well, I think we're going to pump the cabin up there, Charlie, just read the - yeah.
MATTINGLY (laughter) They didn't make the string quite long enough.
SC Okay?
SC Where is it?
SC Well, we'll find it if it comes - well I don't want to let it come loose on the panel, can you reach - you got it? Okay I'm going to open it, okay? All set? Here we go. I've got to open the purge valve.
SC I can reach the purge valve.
SC (laughter.)
PAO Cabin pressure now reads 3.7 PSI.
SC It's under your card there.
SC Five and a half.
PAO Cabin now at 4 PSI.
SC Might as well, we want to empty it before entry.
CAPCOM 16, can we have AUTO on the high gain.
SC Can you reach it, okay.
SC Good thing you can reach it, that's where my OPS is.
SC Okay, how's the cabin.
SC Is it? Maybe I won't have to turn this thing off.
SC Is it still flowing, Charlie?
SC Cabin regs are off.
CAPCOM Ken, we're showing 5.0 down here.
SC Okay, thank you. I'll buy that.
SC When I closed it I understood what you meant (laughter). Right.
CAPCOM Ken, would you shut the LPS off, we show 5.5.
SC Okay, is there anything wrong with taking it a little higher?
CAPCOM You can take it on up to about 5.7, 5.8, Ken.
SC Okay, if you don't mind.
PAO Apollo Control, Houston, the crew of Apollo 16 back inside the spacecraft, the hatch closed, the cabin pressure up to 5.7 PSI at the moment. Apparently a very happy crew at the close of this of this EVA as was evidenced by the laughter and giggling that we heard over the air/ground loop.
CAPCOM We're showing you 5.8 now Ken.
SC Okay, it's off. Okay, I'm going to pop the purge valve.

END OF TAPE

SC Yes, sir.
SC (laughing)
CAPCOM Ken, did you ever get the MEED lock?
SC Yes, sir.
CAPCOM Okay, verify it was locked.
SC Okay, it probably got another 5 seconds of exposure.
CAPCOM Okay, real good.
SC Got another 5 seconds of exposure not all of which was on the indirect UV. But as soon as, got it in the cockpit where a couple guys could get at it, it was locked.
CAPCOM Good show.
CAPCOM OMNI Delta, 16.
SC Can you get OMNI Delta?
SC (garble).
SC I don't know.
SC Hey, why doncha hold tight there.
SC Okay.
SC That will do it. You've got it.
SC Oh, Oh. (laughing) It's up in the - it's up in the
SC Leave it in the tunnel.
SC Oh, there's more accessory bags up there.
Just get one of 'em out.
SC Okay, both of them have an accessory bag in them.
SC Why don't you take me off of VOX too.
SC Thank you.
CAPCOM Ken, we were enjoying that. Sounds like you were having a lot of fun.
SC I mean to tell you. I believe he was enjoying it.
CAPCOM Sure sounded like it.
SC Charlie's already said all he can say about it. And he said it 45 or 50 times already.
CAPCOM Roger.
SC Want to hear Charlie's words.
SC Boy! Is it black out there!
CAPCOM 16, can one of you see the battery compartment reading now?
SC It's 20 Hank.
CAPCOM Roger, 2.0.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/25/72 CST 16:06 GET 244:58 815/1

PAO This is Apollo Control Houston at 245 hours
3 minutes ground elapsed time. We now show Apollo 16 170 658
nautical miles away from the Earth. Velocity now reads 4015
feet per second. During the transearth EVA Command Module Pilot
Ken Mattingly's heart rate raised from 130 to 168. Lunar Module
Pilot Charles Duke and Commander John Young's heart rates ranged
from 70 to 80 during this period. We're at 145 hours 4 minutes
ground elapsed time. This is Apollo Control Houston.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/25/72 CST 16:11 GET 245:03 MC816/1

CAPCOM Apollo 16, Houston. When you get a chance,
no rush, we'd like to switch over to BD roll.

END OF TAPE

CAPCOM Apollo 16, Houston.

SC Go ahead, over.

CAPCOM Roger. John, when you all get through stowing and cleaning up there, whenever you're ready to pick up in the flight plan, give us a call we got a little change to that SIM bay configuration and we won't bother you with it now till you're ready for it.

SC Okay, thank you, Hank.

SC Hey, listen. We could go to a SIM attitude or something and clean up in that attitude. We don't have to stay in this attitude, Hank. Cause it's going to take us a long time to get these suits off and get all this stuff stowed, maybe like an hour or so.

CAPCOM Okay, John, we're working that up now and if you can do that, we'll give you a call here in a few minutes and start out on it.

SC Sure, we pretty well have to do it one at a time because of, we're sort of loaded with things now. Like rocks and film and experiments.

CAPCOM Roger, I understand.

CAPCOM 16, Houston. We're going to do a shift change now. Don's coming on and that's was a real great job.

SC Thank you, Hank. We enjoyed it. We sure do appreciate your support in looking at some of those gauges for us, when we - We didn't realize we were able to see them in one G but zero G you sort of float up in front of them. Thank you very kindly.

CAPCOM Roger, that's what I'm here for.

CAPCOM 16, Houston.

SC Go ahead, over.

CAPCOM Okay, as soon as you can get to it, we'd like you to maneuver to that X-ray pointing attitude that's listed in the flight plan at 245 20, but we do not want you to configure the SIM bay. We'll give you that item by item after you get in attitude.

SC Okay, that's in work.

CAPCOM Roger.

END OF TAPE

PAO This is Apollo control at 245 hours 25 minutes. We've completed our shift handover in mission control. The flight director on this shift is Donald Puddy and our spacecraft communicator is Astronaut Don Peterson. There will be a change of shift -

SC Roger, thank you.

PAO There will be a change of shift news briefing that will begin in about 15 minutes at about 4:45 central standard time and will be held in the MSC news center briefing room. The television that we're currently showing in the news center is a replay of last night's transmission from the lunar communications relay unit aboard the rover at the Descartes landing site. This is a taped replay. We will be bringing the rover camera up again tonight or more correctly early tomorrow morning. The time on that is scheduled for 12:30 a.m. central standard time. And we're expecting to have the camera operating for about 15 minutes from the lunar surface.

CAPCOM 16, we're going to try to bring up the high gain on PITCH 48 YAW 330 go manual and wide.

SC Okay, plus 48 330, stand by.

CAPCOM Roger.

SC Okay, we got pretty good signal strength about three quarters.

CAPCOM Roger. 16, let's try going narrow on the high gain.

SC Okay, coming in narrow.

SC Okay, Pete, I tweaked up the pitch and you got pretty signal strength in narrow beam.

CAPCOM Okay, thank you.

SC Hey, Pete 16 here. We'd like to see if EECOM can come up with a - something on this battery compartment pressure increase. It appears to us that something is venting in there. I like to tell you before we started the Bat B charger, 3 or 4 hours ago whenever it was. We failed to check it before we started and when we started the charge there was a slight odor that's hard to identify, but it smelled like insulation. Then we stopped the charge, reconfigured again mainly I stopped the charge because I was looking at the wrong thing. I was looking Bat bus B and I saw the currents go negative which is nominal, but - so I stopped the charge and went back to BAT B charge and it looked okay, and there was no odor. Then we looked at the systems test and we had 3 volts. We been venting now on ya'lls request and if we vent it to 1 and then it immediately starts climbing back to 0145 and then it slowly increases and usually stabilizes out at about 2 or so. Over.

CAPCOM Roger, we copy. That's in work.

SC And I'd like to know right now how many amps we got in A, B, and C.

CAPCOM Okay, stand by one.

END OF TAPE

CAPCOM Okay, 16, I've got the SIM bay basic configuration that we'd like to get you into as soon as we can. And I'll read them to you one at a time and you can configure as we go along. The first one is auto RCS select OFF, except A-1, C-2, A-3, C-4, V-3, D-4,

SC Okay, stand by, that was a little fast, John, as a start you got A-1, go ahead, now.

CAPCOM Okay, Charlie, it's

SC Say again, what thrusters you want.

CAPCOM Okay, we want auto RCS select OFF, except the following: Delta 1, Bravo 2, Alfa 3, Charlie 4, Bravo 3, Delta 4,

SC Okay, you got, D-1, B-1, A-3, C-4, B-3, and B-4.

CAPCOM Roger, copy. Okay, we need to go PCM bit rate high,

SC We were in high.

CAPCOM Okay, and S-band AUX T.V. to SCI.

SC SCI

CAPCOM Alpha X-ray experiment covers closed.

SC Okay, Alpha X-ray experiment covers are closed.

CAPCOM Roger. Gamma ray boom deploy to OFF.

SC Stand by. Rog. it is OFF.

CAPCOM Roger. Gamma ray boom jett to OFF.

SC Okay, it's OFF.

CAPCOM Okay. Gamma ray experiment ON.

SC Gamma ray's coming ON.

CAPCOM The mass spec experiment OFF.

SC Okay, it is OFF. Mass spec OFF, Rog.

CAPCOM Mass spec ion source verify, OFF.

SC It's OFF.

CAPCOM Data systems ON.

SC It's ON.

CAPCOM X-ray ON.

SC X-ray is ON.

CAPCOM And logic power 2 to deploy retract.

SC Okay, stand by on those 2.

CAPCOM Okay, 16, we've lost the high gain. Lets go wide and REACQ and then step to NARROW like a normal acquisition.

SC Okay. Okay, we got the high gain, REACQ and NARROW. Okay, Pete, the logic switch is at deploy retract, go ahead.

CAPCOM Okay, 16, we need Alpha ON and that will complete the SIM bay configuration.

SC Alpha is ON.

CAPCOM Roger, thank you. Lets go gamma ray deploy for 17 seconds.

SC Rog. The gamma ray's going to deploy for 17 seconds.

APOLLO 16 MISSION COMMENTARY 4/25/72 CST 16:33 GET 245:25 MC-819/2

CAPCOM And 16, would you verify gamma ray ON?
SC Yes, sir the experiment is ON.
CAPCOM Roger.
SC Hey, Pete, our service module AC power is
OFF, right now on 181.
CAPCOM That's the way it should be 16. And --

END OF TAPE

CAPCOM That's the way it should be, 16.
CAPCOM Then -
SC Okay, standby and I'll get, go ahead.
CAPCOM Okay, Charlie, did you get the gamma ray
deploy 17 seconds?
SC I'm going to do that right now, standby.
CAPCOM Roger.
SC Hey, Pete, all our watches have floated off.
Could you - I'll give you a mark and give me a call in 17 seconds.
SC Okay, mark, deploy.
CAPCOM Now, Charlie, on the gamma ray deploy.
SC Say again.
CAPCOM Stop the gamma ray deploy.
SC I think I copied you. I'm now in off on the
deploy switch.
SC Pete, are you reading? Over.
CAPCOM Roger. Say again, Charlie.
SC Roger, I wanted a mark on that gamma ray
deploy. We didn't have any tick-tocks, all ours floated off
here and I couldn't see the event GET mission timer and I gave
you a mark and then I think you said turn it off, so I'm now
in off on the deploy switch.
CAPCOM Okay, we copy, Charlie.
SC Okay.
CAPCOM Okay, 16, would you confirm that SEB 2 cir-
cuit breaker is closed.
SC Naw, they're both open to. We powered down
the SIM bay per checklist for the EVA. Looked for some things
that you guys threw in there as per you - usual.
SC Do you want me to close instruments and SIC
equipment too?
CAPCOM That's affirmative, 16.
SC Okay, going closed. Mark.
CAPCOM Now 16, on your request on the amp hours on
the batteries, battery Alpha is 36, battery Bravo 34 3 and
Charlie 39 0.
SC Okay, thank you very much.
CAPCOM Apollo 16, on the cryo configuration we'd like
02 tanks 1 and 2 to auto, tank 3 off.
SC Roger, have it. 1 and 2 auto, 3 is off.
CAPCOM And 16, on the SIM bay, we'll call all the
changes on the SIM bay in real time until you're cleaned up
there and in a position where you can get back to the flight
plan.
SC Thank you very much.
PAO This is Apollo Control. Our change of
shift press briefing is ready to begin at this time. We'll
switch to the MSC News Center for that event.

END OF TAPE

PAO This is Apollo Control at 246 hours 7 minutes. During our change of shift briefing, we had very little communications with the crew -- about 2 minutes worth, which we'll replay at this time.

CAPCOM Okay, 16, and now we'd like to know alpha particle X-ray cover open. And we'd also like to get one more reading on the battery compartment.

SC Okay, alpha X-ray is going open.

CAPCOM Roger.

SC And the battery is holding at about 221 right around there.

CAPCOM Roger, copy.

SC And it might be climbing slightly, Pete.

CAPCOM Roger.

CAPCOM Seems to you about 8.4, huh?

CAPCOM Maneuver, VERB 49 maneuver at 246 30, I've got the attitudes and high gain angles when you're ready.

SC Uh, go ahead.

CAPCOM Okay, verb 49 maneuver to X-ray attitude will be 174 133 032. And the high gain angles are pitch minus 14 yaw 105 and we want to go REACQ and wide on the high gain and then step to NARROW and normal way. And if you lose com go to OMNI Delta.

SJ Okay, Pete, we'll start maneuvering at 30, and we'll go to 174 133 032. Angles on the high gain minus 14 and 105 at the normal acquisition.

CAPCOM Roger.

SC Okay, do you want us to wait 'til 30 or can we start maneuvering now?

CAPCOM Standby a minute, we're checking. Okay 16, you can go ahead with the maneuver now.

SC Okay.

CAPCOM 16, let's go OMNI Delta. We reacquired a high gain when we went into a new attitude.

SC Okay.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/25/72 CST 17:37 GET 246:29 MC822/1

SC Houston, we still got 1 300 psi on the
ops.

CAPCOM Roger, we copy.

SC Reported as per page X3-22.

CAPCOM Roger, copy.

SC In the middle of the page.

END OF TAPE

SC Houston, 16 on the high gain.
CAPCOM Roger loud and clear, Charlie. Or was
that Charlie?
SC Say again.
CAPCOM Roger, just wasn't sure I recognized your
voice. Your loud and clear.
SC It's me. Got a mouth full of chewing gum.
CAPCOM Rog.
CAPCOM 16, we've got a update to the G&C checklist
on the PIPA bias changes and also we're going to play a
little game with the mixing valve to try and reset it for
the transearth coast. We can do that whenever your ready.
SC Okay, we have something to copy for the
PIPA bias?
CAPCOM That's affirmative. It's in the G&C
checklist page 94.
SC Okay, could you hold off on that and -
we're sort of cluttered here now and give me the mixing valve
is that procedure down on below the couches or just up on the
cockpit.
CAPCOM We can do this all from up in the cockpit.
What we're going to do, don't want you to do it now, but what
we're going to do is put it in auto and EECOM will sit here
and watch the flow rate change and when we get to a certain
lead point on what we think is the desired flow rate he'll
cue me and I'll cue you and we'll go to manual.
SC Roger.

END OF TAPE

CAPCOM UP and I'll cue you and we'll go to manual.
SC Okay, we're ready at your -- give me a mark.
CAPCOM Okay, stand by. Okay, go to auto 16.
SC Mark, auto.
CAPCOM Okay, Charlie, the valve didn't act the way we thought it was going to. It's been oscillating down and back up on flow rate, so we're going to try to catch it in mid cycle and this time when we went to auto it just went up pretty high and oscillating a little but it's staying high. We're going to watch it for a couple or 3 more minutes and if it doesn't work we'll probably have to go down below the couch here and play with the manual valve.

SC Okay. That'll be the trick of the week in our present configuration.

CAPCOM Well we can wait a while for that.

PAO This is Apollo Control at 246 hours 50 minutes. The procedure that we have Charlie Duke, involved in at the moment is attempting to get the proper setting on the mixing valve. This is the valve that controls the amount of the cold water coming back from the radiator's cold water glycol, that is mixed with the warm water glycol that has been circulated through the electrical equipment in the cabin and it's picked up heat from various sources in the spacecraft. By mixing the amount of cold water that is allowed to flow in with the warm water your able to maintain the proper cabin temperature. Since very early in the mission it has been known that the mixing valve which functions in much the same manner as a thermostatically controlled heater valve has been oscillating more frequently than it would normally oscillate. It has been allowing the flow to increase and then shutting it down and increase and shutting down more rapidly. To get around this we've been having the crew set the level manually at what we think is the proper level for the cabin conditions that are existing at the time. The situation at the moment is that we're attempting to have them reset for changing conditions of the spacecraft to take care of the situation that we now have with the thermal loads and the metabolic heat given off by 3 crewmen and the situation as we have in this transearth leg of the flight. To do this we had hoped to have the EECOM here in the control center watching the telemetry data. The procedure is to have the crew in this case Charlie Duke, switch the valve from the manual setting to the automatic setting and watch it cycle and as it cycled and reached the desired level Duke would then switch it to manual and it would hold at that point. the problem initially was that the valve was not cycling in auto as we had seen it but it at last report from EECOM had started down. And when it reaches the proper level Charlie Duke will be given the cue to switch to manual and the mixing valve should then hold at that level. And we would hope that that would be a suitable level for the spacecraft during this transearth coast. Apollo 16 at the

PAO moment is 166,331 nautical miles from Earth. And the spacecraft is traveling at a speed of 4,094 feet per second.

CAPCOM Uh, Charlie it looks like it went back up again. We'll give you another little warning here if it starts back down.

SC Alright.

CAPCOM Okay, Charlie, lets try cycling that switch from auto to manual and back to auto and see if we can get the flow rate to come down.

SC Okay, here we go. Manual, auto, hey Pete there's a--

CAPCOM Go to manual, Charlie, go to manual now, Charlie.

SC (garble)

CAPCOM Go to manual now.

SC Okay, we got manual and there's an awful lot of static on the uplink could you check -- have network check it?

CAPCOM Roger, will do, Charlie.

SC Sounds like a wind blowing.

PAO This is Apollo Control. It appears that with that procedure, which we --

CAPCOM John and Ken, also hearing the same thing?

SC No what it is, is John has his comm carry off but connected and it his PGA one of the mikes was down in the neck ring and the vent tube was blowing on it. It's okay, it's up here. Thank you.

CAPCOM Okay, we understand.

SC It sounded exactly like the radio static, though.

CAPCOM Okay.

PAO Apparently the situation on the noise that Charlie Duke mentioned initially reported was not on the uplink but as you heard him say an unused microphone in one of the suits, I believe he said in John Youngs suit was in a position where it was picking up air flow. Presumably through the suit loop and was in fact putting a noise on their communications loop in the spacecraft that sounded much like wind blowing, which in fact it was.

SC Keep us advised on the flight plan we'd appreciate it.

CAPCOM Okay. Will do.

PAO Again to reiterate on the procedure that we had Charlie Duke going through to get the

END OF TAPE

PAO Now again to reiterate on the procedure that we had Charlie Duke going through to get the mixing valve set at the proper flow rate to keep the cabin temperature adjusted properly. And apparently that procedure worked. Now, what it required was that the mixing valve, in effect, malfunctioned as we have seen it doing in the automatic position where it is cycling rather than holding at a constant level. When we first tried to go through the procedure, the mixing valve refused to cycle in the automatic position, but instead held steady the way it should. However, knowing that this would be a temporary condition that it would again begin cycling at some point, it was still necessary to get it set in the proper position manually. Having Duke cycle the switch from automatic to manual, and back to automatic again, apparently had the desired effect, and immediately after he did this, the EECOM reported the flow rate again cycling in automatic, and as it dropped through 242 pounds per hour, flow rate, we gave the call to Charlie Duke to switch it to manual at that point, at which point it would hold that level in the manual position by the time the message got past from EECOM to CAPCOM and up to Charlie Duke in the spacecraft, and the switch thrown, the flow rate had gone below 242 to 236, but we consider that to be an adequate flow rate to maintain the kind of cooling that would be desirable at this point in the flight. And from the crew description, they apparently still have some stowing to go through following that EVA. Apparently the suits are not yet stowed, and they'll be doing that prior to their eat and sleep period. Also, at the present time they have the spacecraft SIM Bay pointed toward one of the galactic sources of X-ray, using the X-ray fluorescence spectrometry experiment, in an attempt to get some signatures from these various X-ray sources in other galaxies.

CAPCOM 16, if you read go manual, and wide on the high gains.

SC I sure read ya Pete. It looks like either our antenna's acting up or the uplink's being dropped.

CAPCOM Roger.

SC Do you want me to try reacquisition?

CAPCOM Let's try REACQ and WIDE, and you won't try to step to NARROW.

SC Okay, the pitch is oscillating right now between about minus 10 and minus 40.

CAPCOM Okay, let's stay where we are until it settles down, if it will.

SC Okay, you in REACQ and WIDE.

CAPCOM Roger. Is it oscillating now, Charlie?

SC Not in REACQ. No, it settled out in minus about minus 15.

APOLLO 16 MISSION COMMENTARY 4/25/72 246:58GET 18:06CST MC-825/2

CAPCOM Okay, let's go to NARROW.

SC Okay. And it doesn't look like it took, Pete.

CAPCOM Say again?

SC Okay, Pete, I went to manual, and tweaked up
the pitch a little bit NARROW and --

END OF TAPE

SC Okay, Pete, I went to manual and tweaked up the pitch a little bit and then went to narrow and REACQ and it looks like we've got it now.

CAPCOM Okay, looks good to us too now Charlie.

CAPCOM 16, we'd like to deploy the gamma ray to 4 feet and that's 13 seconds from where you are now.

SC Okay, in work. Okay, exactly 13 seconds.

CAPCOM Roger, thank you.

CAPCOM And 16, could you give us a battery manifold pressure read out, please.

SC You mean the battery compartment.

CAPCOM That's affirmative.

SC Yeah, it's a just a minute - I think it's crept up to about 22 now, Pete. Yeah, it's 22.

CAPCOM Okay, thank you.

PAO This is Apollo control at 247 hours 50 minutes. It's been a rather quiet crew for the past 30 or 40 minutes aboard Apollo 16. At the present time they have the spacecraft scientific instrument module bay pointed toward one of the X-ray sources in deep space. And the principle investigator for that experiment the X-ray fluorescent spectrometry experiment reports that we are getting good counting data on the X-ray source. Later this evening the crew will be aligning the guidance system platform which is used as a stable reference for attitude determination. They're also are scheduled to change out one of the Lithium Hydroxide canisters which removes carbon dioxide from the spacecraft cabin atmosphere. A little while ago we had Charlie Duke set the mixing valve which controls the cabin temperature manually in the proper position. And that appears to be doing its job properly at the moment. The crew is scheduled to begin a rest period at 252 hours 30 minutes or approximately 11:30 Houston time. And around 12:30 Houston time INCO the Instrumentation and Communications Officer here in the control center plans once again to turn on the television camera aboard the lunar rover at the Descartes landing site and we'll operate that for about 15 minutes. We'll be receiving the television through the 210 foot dish antenna at Goldstone, California. And again, we'll be pointing the camera by remote control from the control center at various rocks and hills around the landing site allowing geologists to get a second look, in this case a third look at these features. The camera was activated last night, and we took a similar pan of the landing site looking at rocks, interesting rocks and interesting features and that will be done again this evening actually early tomorrow morning for about 15 minutes. In the control center we now have a clock counting down to entry. That event will occur will occur at 42 hours 31 minutes from now, with Apollo 16 reentering earth's atmosphere

APOLLO 16 MISSION COMMENTARY 4/25/72 CST 18:30 GET 247:22 MC826/2

PAO The spacecraft at this time is
163 952 nautical miles from earth and we're watching the
velocity increase gradually and that will be a continuing
thing that we will be seeing and as we get closer to entry, the
velocity that now is reading about 4 100 feet per second will
be up in excess of 36 000 feet per second.

END OF TAPE

SC Houston, 16.

CAPCOM Go ahead, 16.

SC Okay, Pete, I was just looking through the flight plan, we're a little off on the biomed, I'm still on the biomed, Ken and John are off now, their stowing suits.

CAPCOM Okay, Charlie, and while I've got you on the subject of biomed here, the doctor advises that they were unable to monitor you during the EVA this afternoon and it looks like you may have to do some troubleshooting on the thing. And you were scheduled to be monitored tonight however that's not a hard and fast requirement they could monitor the CMP tonight instead and that'd give you a little more time to work with your harness.

SC Okay, what are they seeing right now?

CAPCOM They're not seeing anything right now.

SC Ah, so. Well I put some new sensors on this morning before we got suited, when I get my suit off I'll check it.

CAPCOM Okay.

SC Houston, 16.

CAPCOM Go ahead, 16.

SC Okay, Pete, the biomed doesn't work very well unless you hook it up, when I put on the suit I forgot to hook it.

CAPCOM Okay, we copy. Okay, Charlie, we'll stick with the nominal plan and then we'll monitor you tonight.

SC Okay, that's fine, I'll be off in just a little bit.

CAPCOM Okay.

SC Okay, Pete, we're back up again on the steerable.

CAPCOM Okay.your (garble).

SC Okay, for some reason here we're sitting in REACQ and NARROW and I can move the YAW (garble) and drive the antenna.

CAPCOM Okay, we copy. Charlie, we're thinking about it, we'll get back to you in a minute.

SC Okay.

CAPCOM Charlie, apparently the problem is that the position that we're in now we're right at one of the scan limits of the antenna and when it comes on that limit it automatically switches to manual so intermittently it would be in a situation where you could drive it.

SC Ah, so, I see thank you.

END OF TAPE

CAPCOM 16, we've got a station handover here in about a minute. And because we are on the scan limit on the high gain we may lose contact temporarily.

CAPCOM 16, Houston. I've got a verb 49 maneuver for you and we need a battery -

SC Understand a verb 49 maneuver.

CAPCOM Roger, coming up at 45 minutes past the hours a couple of minutes away and that's maneuver to 332 280 000 high gain angles are pitch 10 yaw 260.

SC Okay, Pete verb 49 maneuver say the time you want to do it at.

CAPCOM Oh, about a minute from now.

SC Alright a minute from now 332 280 000.

CAPCOM That's affirmative. It's not real time critical -

SC And plus 10 and 260.

CAPCOM That's affirmative. And that maneuver is not time critical.

SC And that's - it's not.

CAPCOM Negative. Just - you can go ahead and do it now or you can wait a few minutes whatever you want. And 16, we'd like another read out on the battery compartment, too.

SC It's reading 2.2 about 5 2.25.

CAPCOM Roger, 2.25. OMNI delta 16.

CAPCOM Would you close the X-ray alpha cover as soon as you can.

END OF TAPE

SC In fact, he was just flying around it.

CAPCOM Roger.

PAO This is Apollo Control. Our flight plan time is now 248 hours 54 minutes, and aboard Apollo 16 the crew is keeping the spacecraft scientific instrument module bay pointed at a galactic target known as sco X 1. This is a galactic X-ray hot spot source of unusually high X-ray emission, and in order to maintain the proper thermal equilibrium within the spacecraft, actually on the spacecraft surface and for the various equipment located beneath the surface of the CSM, the crew is rotating in such a way that they will change the way the Sun is shining on the vehicle, but at the same time maintain the proper orientation within the SIM Bay so that the alpha -- rather the X-ray spectrometry experiment maintains it's proper pointing attitude. As they're going through this maneuver, we're having momentary drop outs in communication, but expect that they will have the high gain antenna locked up again. In fact, we do now have apparent solid lockon. In about an hour, the crew will be again aligning the platform of the spacecraft, the stable platform used as an attitude reference. They are then scheduled to have an eat period. They'll be changing out one of the lithium hydroxide canisters, and at about 252 hours 30 minutes beginning an 8 hour rest period, and that will be at, a little after 11:30 Houston time. We presently show Apollo 16 some 161 300 nautical miles from Earth, traveling at a speed of 4186 feet per second. And the spacecraft has just maneuvered out of antenna lockon so that we're getting again the noise on the communication circuit. And we would expect that to clear up momentarily. Our clock counting down to entry interface, the point at which Apollo 16 will reenter the Earth's atmosphere, shows that we're now 41 hours 27 minutes away from that event.

END OF TAPE

CAPCOM 16, would you try to bring up the high gain now on pitch 10 yaw 260 and you can follow it up by getting the alpha particle X-ray door open and the gamma ray shield off.

SC Roger, understand high gain minus 10 at 260 on high gain.

CAPCOM It's plus 10, 16.

SC Follow that up by the gamma ray door - alpha X-ray door to open and the gamma ray shield on.

CAPCOM Gamma ray shield off and that's plus 10 on the high gain.

SC Plus 10 on the high gain.

CAPCOM That's affirmative.

SC Okay, the doors open and the shields off.

CAPCOM Roger.

SC 16, we need the high gain if you can bring it up.

CAPCOM Okay, 16. We're getting it now.

SC How does that look to you, Houston.

CAPCOM That looks real good.

CAPCOM Okay, 16. We need to go extend or deploy on the gamma ray for 26 seconds.

SC Okay that's in work.

CAPCOM Roger, and we do not want to retract it first just extend it for 26 seconds from your present position.

SC Okay.

CAPCOM And 16, we've got some national and local news here for you while your finishing up with your chores, there. The - first of all Ken Mattingly made the headlines today in connection with the EVA and we got a big cartoon here showing the Apollo 16 intercelestial hauling company coming back from the Moon with a big load of rocks. Looks like they've made a railroad car out of a SIM bay here and got a big pile of rocks on it there, Moon in the background and all of that sort of thing. Got a couple of things here one from Vietnam, communists tanks drove retreating South Vietnamese soldiers toward the provincial capital of Contom in the central highlands today forcing government troops to abandon two more artillery bases in the town of Dakto. Seven bases in the central highlands have fallen to the communists since Sunday. Ten waves of B52's bombed Communist troop positions during the night in an effort to stop the offensive that appeared aimed at Contom. And from Northern Ireland some guy found a new use for a baby carriage. He packed it with gelignite, which one of our back-room guys here tells me is an explosive and bombed Northern Irelands main telephone exchange during the night in a major attempt to disrupt the provinces communications. The carriage exploded in a sheet of flames shortly before midnight Monday outside the Belfast telephone exchange injuring

CAPCOM two British soldiers and a civilian and toppling part of the wall of the seven story brown brick building. And the Astros amazed everybody, I guess, by winning their 7th straight today. Chicago's Ron Santo and Houston's Lee May bashed two run homers for each side in the first inning and then the two teams battled tenaciously without another score until John Edwards smashed an 11th inning homerun that gave the Houston team a three to two victory. That's makes it seven in a row for the Astros and brought them a first place tie with the Los Angeles league West and gave them the best nine game start that's seven wins and two losses in the teams ten year history.

SC Go get them Astros.

CAPCOM Okay, got another little thing here in the local paper you might be interested in. Houston paper reports that the city is moving to annex a 50 square mile area west of Houston including the federally owned Addicks and Barker reservoirs and the land between them and the present city limits. The annexation reportedly would open the way for the city to develop the reservoir areas for recreational purposes. And I guess that does not - the annexation would not include about four square miles of Barker reservoir in Fort Bend county which is outside the city's extra territorial jurisdiction. And three U.S. representatives have studied a feasibility study of deep water ports in the Gulf of Mexico and have recommended the Texas Coast is a possible site. Texas representatives Jack Brooks of Beaumont, Bob Eckhardt of Houston and John Young of Corpus Christi appeared here Monday at a U.S. Corps of Engineer public hearing to voice their opinions on such a facility. Okay, the weather here is real nice. Houston and vicinity was fair all day and tonight becoming partly cloudy Wednesday warm afternoons cool again tonight the paper says. High today was in the upper 80s low tonight in the upper 50s and high Wednesday in the mid 80s. And dry cool air prevailing over most of the U.S. And more immediate interest, the weather in the recovery area is excellent and forecast to stay that way.

SC That's the best news we've heard in a long time.

CAPCOM And we got one final item here, I thought you might find interesting. The Lupus better business bureau couldn't help the man who complained that a car dealer refused to refund his fifty dollar down payment after he decided not to buy the car. And apparently he hadn't told the better business bureau all the facts because it turns out the dealer suggested that he take the car for a test ride and he did but he was gone three days and put 1 500 miles on the car.

SC (Laughter) terrible.

SC And then he didn't want to buy it.

CAPCOM He didn't want to buy it and he wanted his money back - his fifty dollar down payment.

SC (Laughter).

CAPCOM You can probably find a lot of flaws with that kind of test procedure.

SC Yeah, sure can. How did the TV look down there with Ken outside I was watching it on the monitor. It seemed like - in places it was too bright and other places not bright enough. And I guess that's the way - I guess unfortunately that's the way the sunlight is up here.

CAPCOM Yeah, I guess we agree with that, but the pictures were overall real good, John. They looked real good to us you could see a lot of the detail and I don't think we missed very much there were some dark areas.

SC Okay, fine. Darkest area ...

END OF TAPE

CAPCOM -- some dark areas.

SC Okay, fine. I'll tell ya, the darkest area, Pete, is looking away from that Sun. Boy, is it black out there!

CAPCOM I bet.

SC That's time number 47. I know you guys won't believe this, but after spending three days among the rocks, ever so often, when we're sittin' around in here, we see a pebble go by. And that's the truth, I don't know what we're going to do with them.

CAPCOM Just a pebble, huh?

SC I guess they'll all get collected in ECM, yeah.

SC Uh, when we came back in our suits, it got in. I guess we pretty well tracked a lot of dirt into the LM unavoidably, and we weren't able to clean it up. So when we docked we tried to keep it all in the Lunar Module, but it -- this inflow valve over here, which was the only thing that was really working once we got powered down. Then when we went back in there and powered up everything, we took the Command Module hose over with us, and that circulated the air. And I think we ended up with quite a few unexpected little pieces of Moon rock in the Command Module.

CAPCOM Roger, understand.

SC And everytime Charlie sees one floats by he picks it up and charges his story.

CAPCOM He's still analyzing them, huh?

SC Yeah, I got it all straight now though, Pete.

CAPCOM Good.

SC I will be unswayed by the facts when we get back.

CAPCOM Rog, understand. And would you give us gamma ray shield on now please?

SC Rog. Hey, Pete, looking away from -- on that EVA, looking away in it out into that blackness, you get the distinct impression that you don't won't to let go.

CAPCOM Yeah, I can believe that. Even on TV it looks pretty dark out there.

SC I guess -- we're sittin' around talking about it here when we had a few slack moments, and one of the things we think is that no matter what you see on the pictures or what you see on the TV, or what you'll see when we get back with these pictures, you just don't have a feeling of about how stark and brilliant these colors are. Like Descartes was the most dazzling place I believe I've ever been. It just absolutely -- brilliant colors that contrast in that bright Sun, and the same way for this EVA that Ken and Charlie just finished. Why it -- looking out that hatch, its a black that you can take with a camera is not going to show up the way

SC that that black actually was.
CAPCOM 16, we've got about three more small items. We've got an update to the G&C checklist, one change to the flight plan at 251:45, and we need to get John's PRD reading.
SC Okay, well I just packed the thing away in the suit locker, if you want me to dig it out I'll get it, but it's going to be a job.
CAPCOM Standby one.
SC I'm sorry about that, but that thing is just hard to get a hold of, and keep a hold of.
CAPCOM Okay, John, I guess we'll try to get to it sometime tomorrow, maybe.
SC Well, in other words you tell me that you want me to go in there and dig that thing out, and I don't mind doing it if it's got to be done, but I mean -- I can't see I'm getting anymore PRDs than the other two guys.
CAPCOM Standby John, we're having a little discussion here.
SC He's been within a couple of counts of me, Pete, during the whole flight.
CAPCOM Roger. While we're waitin' you want to go ahead and get this change in the flight plan at 251:45?
SC Yes.

END OF TAPE

SC (garbled)
SC Okay, Don, go ahead.
CAPCOM Okay, 251 45 which is gamma ray retract and then deploy. We want to strike out the part that says retract and also we want to change the 45 seconds to 12 seconds. What we're going to do is bring it back in from it's present position. And we want to make that a retract instead of a deploy.
SC Okay, that's a retract of 6 feet and 12 seconds from the existing position.
CAPCOM That's affirmative. And, also, I've got this update on page G9-4 3&N checklist.
SC Okay, I'll have to - unstow that thing and see where we put it.
CAPCOM Okay.
SC Hey, Don, you got a pencil out there?
CAPCOM Affirmative.
SC Okay, we've got a flight plan update that starts at 249 hours and 39 minutes. It's called Crew Eat Period.
CAPCOM Roger.
SC Just thought we ought to be able to make some real time changes from up here too.
CAPCOM Roger. That sounds reasonable. I think we've done our share in the last couple days.
SC Yes, I'm sure you'll - you have earned the medals you will receive.
CAPCOM That sounds tragic.
SC (laughs) Okay. How about I got G9-4 here.
CAPCOM Okay. We want to change in column A line 5 should now read 03753, and line 7 should read --
SC Okay, that's 03753 line 5 and column A.
CAPCOM That's affirmative. And in column A line 7 that one should now read 76605.
SC 76605 for line 7 in column A.
CAPCOM That's affirmative and that completes that update.
SC Okay.
CAPCOM And I believe that's everything we got for you.
SC Alrighty.
SC And in line with our 20 plus hour clock sink we had to go to day 10 meal B to catch up.
CAPCOM Say again, John.
SC And it looks overwhelming.
SC John says in order to catch up with the clock sink, you're making us eat day 10 meal B and the task is overwhelming.
CAPCOM Roger, I understand.

CAPCOM Is that why you scheduled the extra eat period tonight?

SC Just remember they come in pairs.

CAPCOM Rog.

SC We missed the one that was supposed to start 3 hours ago or whenever it was.

CAPCOM Rog. I understand.

PAO This is Apollo Control. A short while ago - that was Ken Mattingly who gave us a flight plan update, obviously in retaliation for the hundreds of flight plan updates that Mission Control has passed up to the crew since they got behind in the flight plan. After the late landing on the lunar surface and CAPCOM Don Peterson is now advising the crew that we'll delete the requirement for that radiation dosimeter reading.

SC Okay, well take it.

CAPCOM Alrighty.

SC We sure appreciate you helping us. If you could have seen what we were looking at a couple hours ago, you wouldn't believe it. We couldn't - we had to let stuff pile up in here that none of the three of us could see each other, and that's the truth.

CAPCOM Roger.

SC Which the way we look right now isn't really such a bad deal.

CAPCOM Rog.

SC John was reading the checklist and Ken was down there, we couldn't even see him and all of us - and every once in a while a hand would come through this mass of beta cloth and Basset camera cassettes and things and reach out and grab something.

CAPCOM It's amazing to me you found a place to put it all.

SC Ah, Ken's super-well organized on that EVA boy, I'll tell you. We just - he got everything all put away and we're just about ready for entry. Well, not quite. We haven't found a place to put all of it to be honest with you. But we're looking.

CAPCOM Roger.

END OF TAPE

SC Well, Ken's super well organized on that EVA boy I'll tell you. He's got everything all put away and we're just about ready for entry.

SC Well, not quite we haven't found a place to put all of it to be honest with you. But we're looking.

CAPCOM Roger.

SC After eight days we finally got organized on this eating. Ken cuts it open, I fill it with water and Charlie eats it.

CAPCOM Roger.

SC Hey Houston, 16. The LMP is on biomed now.

CAPCOM Understand, LMP is on biomed. And 16, right now we're not getting a readable signal, but we're going to run some checks here first.

SC Okay.

CAPCOM Okay, Charlie, apparently your biomed is still not functioning properly and the surgeon would like to go to the CMP to monitor for tonight.

SC Okay.

CAPCOM And 16, could you give us another reading on the battery compartment.

SC 2.3, Houston.

CAPCOM Roger, 2.3.

SC Hey, Don does that mean if I break mine tonight that I don't have to put it on again.

CAPCOM I'm not sure we'd concur with that.

PAO This is Apollo control at 250 hours. The crew aboard Apollo 16 now apparently getting caught up with their eating. After what they described as a rather involved job of getting piles of material stowed a job which John Young said they still haven't completed but they're looking for places to get everything tucked away neatly prior to entry which is now some 40 hours 23 minutes away. And we also have a clock counting down to the time of splashdown which would be 40 hours 36 minutes from now. And about 2 1/2 hours from the present time or at about 252 hours 30 minutes we expect to say good-night to the crew and get them bedded down for an 8 hours rest period. As they have begun to make headway in getting things stowed away and getting the cabin ship shape again we find them much more talkative. During the past hour we've gotten a rather picturesque description from all three crewman. They would appear to be in obvious good spirits. You heard a conversation between capcom Don Peterson and John Young in reference to the PRD, or personal radiation dosimeter. These are radiation meters carried in the suits of each of the crewman measuring their exposure to radiation and Young reported that he had stowed his suit with the radiation dosimeter packed away in the suit because of the problem in getting

PAO this instrument out and the fact that his dosimeter had been reading very closely to the readings that we were also getting on Charlie Duke's coupled with the fact that none of the levels have been anything for concern we've given Young a go ahead to leave the dosimeter stowed where it is. We'll have no further requirement to get a radiation dosimeter reading on him. At the present time Apollo 16 is 158 668 nautical miles from earth and the spacecraft velocity is up now to 4 239 feet per second and that just updated to 4 240. At the time of entry the velocity will reach some 36 196 feet per second. And we're currently showing entry interface angle. The angle at which the spacecraft enters the earth atmosphere to be minus 6.6 degrees. The midcourse correction performed at midcourse correction 5 opportunity earlier in the day brought that flight path angle from something in excess of 7 1/2 degrees down to 6.6 which is getting close to the desired 6.5 and ...

END OF TAPE

PAC At the time of entry, the velocity will reach some 36 196 feet per second. And we're currently showing an entry interface angle, the angle at which the spacecraft enters the Earth's atmosphere to be minus 6.6 degrees. The midcourse correction performed at midcourse correction 5 opportunity, earlier in the day, brought that flight path angle from something in excess of 7.5 degrees down to 6.6, which is getting close to the desired 6.5. And we do have a midcourse correction opportunity, the so-called midcourse correction 7, which comes shortly before entry interface. And at that time would expect a small correction again to bring the flight path angle down to the desired 6.5. The time of entry is determined by the transearth injection maneuver. From that point on the midcourse corrections are targeted to control the entry interface angle. This is the angle measured below horizontal, and describes the amount of the angle at which the spacecraft is digging into Earth's atmosphere. Any negative number has it entering, a positive number would show that the spacecraft was coming in such a way that it would not reenter. This entry interphase angle is set so that the spacecraft comes in at about 6.5 degrees below horizontal. This gives the proper balance between an entry that does not produce excessive G forces, and one that bites in sharply enough to Earth's atmosphere to assure capture. And that again, that, nominal entry interface angle is 6.5 degrees. We're currently showing 6.6 which is very close to that desired. About the only activities that we now show on the flight plan prior to putting the crew to sleep, are to do a platform alignment, aligning the guidance platform which is used as an attitude reference. We have an activity called contamination control, which primarily involves removing the screens from the environmental control system and clearing them off. You heard John Young report that there's a fair amount of dirt and debris which is almost inevitable from the amount of dirt brought back on their suits from the lunar surface. And we routinely, during the transearth coast, perform a number of these contamination control operations to minimize the amount of dirt collecting on the screens, the filtration screens of the environmental control system. They also will be changing out one of the lithium hydroxide canisters that absorbs carbon dioxide, keeps the amount of carbon dioxide in the cabin atmosphere at acceptable levels. And up through 251 hours 30 minutes, the crew is scheduled to have the X-ray fluorescence experiment in the scientific instrument module bay pointed at sco X 1, the galactic source of X-rays which allows the principle investigator to get a calibration, so-called signature, of the X-ray energy admitted by this galactic source.

END OF TAPE

SC Houston, 16.
CAPCOM Go ahead, 16.
SC Rog. Pete, uh, we're wondering if you could get FAO working on the Mars attitude sequence and see if could come up with one that during our normal flight plan where we got some sun in the windows, so we could get some interior photography?
CAPCOM Stand by and we'll take a look at it. Okay
FAO says he thinks he can --
SC Appreciate it.
CAPCOM FAO says he thinks he can work that in and also we need to remind you, I guess, that we need a P-52 before you go to bed tonight.
SC Rog. Just as soon as John, gets out of the kitchen, Ken's, going to give you one.
CAPCOM Roger. understand.
SC We're just looking at the flight plan here and we just finished day 10 meal B and 10 minutes from now we got to start on day 10 meal C.
CAPCOM Roger, copy.
SC That was John.
CAPCOM Roger. They said that sounds like some of the flight planning that's been going on down here.
SC If Alex--Pete, if Alexander the Great had had this kind of chow he could feed his whole army for 2 days on what we eat in one meal.

END OF TAPE

CAPCOM 16, we've got the torquing angles you can go ahead and turn them.

SC Okay.

SC Hey, Pete will Tony be on before we go to sleep? He said he had some geology questions for us.

CAPCOM Doesn't look like it now. He's scheduled to be here in a couple of hours or maybe he might come in a little sooner than that.

SC Thank you.

PAO This is Apollo control at 251 hours.

Flight director Don Puddy has just recently completed going around the room checking with all of his flight controllers to see if everything appears in good order to put the crew to bed. We plan to do that in about an hour and a half at a flight plan time of 252 hours 30 minutes. And everything appears to be in good order at this point. The crew is presently completing the program 52 guidance platform alignment. That will pretty much complete the flight plan activities prior to the sleep period. One or two minor activities that they will need to complete such as changing the lithium hydroxide canister, but they have completed eating and are in pretty good shape to begin their sleep period on schedule. One of the activities that they will be doing prior to beginning the rest period is setting the spacecraft up in the passive thermal control mode. They'll be doing this in a slightly different manner than previously. Normally, the spacecraft is set up with the longitudinal axis at right angles to the earth Moon plane. Tonight when they set it up in passive thermal control the crew will be pitching the spacecraft back slightly from their normal right angle attitude. This is to allow the instruments in the scientific instrument module bay to continue pointing at the desired targets and still to keep the spacecraft rotating to maintain the proper thermal control. But every rotation it will come up on the proper target. The command module pilot, Ken Mattingly will be wearing the biomedical harness tonight. He'll be the crewman that the flight surgeon will be monitoring heart rate on. That had in the flight plan scheduled to - the flight plan had scheduled lunar module pilot Charlie Duke to be wearing the biomedical harness during the sleep period; however, as you heard Duke's biomedical data was erratic and we are getting heart rate on him, but it's not consistent and it's not good solid data.

CAPCOM 16, Houston. I've got that pair of items for you here that'll wind it up for the night, I think. First of all I'll start out talking about this battery compartment. We've looked at it, now, over quite a period of time and we feel that the pressure rise is due to a very tight cabin battery compartment that prevents any leakage from the compartment to the cabin. And, also to the increased battery

CAPCOM venting. Now the increased battery venting resulted from recharging the batteries longer than normal and that in turn resulted from the high discharges during LOI and DOI burns. We really don't feel there is anything wrong with the batteries, in fact, right now we're looking at a requirement from now until the end of the mission of about 30 amp hours and we've got about 100 amp hours in the batteries right now. We'll continue to check the battery compartment pressure, but we really don't expect to have to vent the compartment or to perform any additional battery charging prior to entry. We'd like to get one more read out prior to your going to sleep. We'll periodically check tomorrow, but in summary we feel that there's really not a problem. And the odor that you mentioned is probably not from the battery compartment, but is more characteristic of the battery charger.

SC Okay, Pete, thank you very much. That makes me feel better. I was just a little bit gitchie about recharging especially BAT B since that's where we first experienced that odor. We had not done that previously and that makes that sound like a pretty good story. And, we haven't been monitoring that compartment on the systems test meter very much so we really can't give you a history of it. But that sounds pretty good to me. Thank you.

CAPCOM Okay ...

END OF TAPE

SC systems test meter very much so we really can't give you a history of it. But that sounds pretty good to me. Thank you. What else?

CAPCOM Okay, we do want to monitor the CMP on the biomed and I guess we're still showing that you're on the biomed monitoring system, right now. Also your equipment --

SC That's right--

CAPCOM Also, Charlie, your e--

SC Go ahead.

CAPCOM Your equipment is apparently still not functioning properly, so we'll need you a new biomed harness on you, probably for tomorrow night. We need to get that on sometime tomorrow.

SC Okay, fine, I'll be glad to do that. What appears to be wrong with the signal?

CAPCOM Stand by one. They think that the sensors are probably lose again, there's maybe some drying on the electrolight under the sensors, but rather than try to troubleshoot that, they figure it's better just to go to a new harness.

SC Okay, will do. I just put these on this morning, new, but we'll swap out in the morning.

SC Hey, Don, what film magazines do we have allocated for our little uh, little uh, F equals MA experiment?

CAPCOM Hang on just a minute, I'll get it for you. Let me give you one more item here while I'm -- then I'll get that for you. We'd like to -- right after we go into PTC and get onto the OMNI we'd like to put the telecomm group 2 to AC 2, the reason for doing that is we just want to return the spacecraft to a nominal configuration because that's the way all our documents and onboard check lists and so on are written.

SC Alright, we'll do that, when we spin up go on the OMNIs we'll go to group 2 to AC 2.

CAPCOM Roger, thank you. And also we'd like to get an ox readout sometime prior to your going sleep tonight.

SC Okay, we gave you one early and it's stowed in A 8 now and it was 1300 at that time. You want another one?

CAPCOM Roger, yes we'd like to get one more, Charlie.

SC That was plenty of time after it had it was probably at least an hour and a half after you'd had a chance to equalize after the blow down.

CAPCOM roger. Okay, 16, if it's not readily accesable, that's okay it's not that big a deal.

SC Is that all?

CAPCOM That's affirmative, 16, I believe that covers everything.

SC You know Pete on that battery I took a

SC peak at it every once and a while during the EVA and it didn't vent at all into the cabin.

CAPCOM Roger.

SC My only other question is, why does the when you vent it to 1, why does it climb so rapidly back up to about 16 or so?

CAPCOM Stand by a minute, Charlie, we're thinking about that. Oh, on the questions on the trying to get some sun in the windows tomorrow, you'll be in PTC a great deal of the time and during a lot of those PTCS you will have enough sunlight in the windows for interior photography.

SC Okay, thank you. Yeah, I was just wondering if one of the other periods might also place the sun, in our window, because -- when you do a PTC although it comes by very often and you want to photograph a continuous sequence it kind of chops it up pretty quickly. Takes an awful lot of planning to hit the lighting at the same time you want to do something.

CAPCOM roger.

SC But it doesn't justify another attitude or anything like that this is just so we can get better pictures inside.

CAPCOM Okay, I'll see what I can do on that, Ken. Okay, Ken, we've got magazine LL, that's unscheduled and has CIN film.

SC Okay, thank you very much.

END OF TAPE

CAPCOM 16, on the sunlight coming in the window in a fixed attitude tomorrow. The situation doesn't really look real good. About the best one I guess is at one point we'll have the sun about 40 degrees from the normal to the hatch window and about 20 degrees - that's 40 degrees off in pitch and about 20 degrees off in yaw. So, and that's about the closest we have to having sunlight coming right down normal to any of the windows. Ken, I think I said that was 40 degrees in pitch and 20 degrees in yaw and it's actually 40 degrees in pitch and 20 degrees off in roll on that sun angle.

SC Hey, Don I just plugged back in would you say again, please.

CAPCOM Okay, on this business of getting sunlight in the spacecraft windows. About the best we're going to be able to do is one attitude gives you a sunlight which is if you take the normal to the hatch window the sun is about 40 degrees off of that in pitch and about 20 degrees off in roll. And that's about the closest we're going to have to having sunlight coming directly in a window. Oh, and Ken - -

SC Okay, well we do with what we have, then.

CAPCOM Okay, I've just been advised that that's not the hatch window, it's window 5 and that attitude occurs about 269:30 in the flight plan.

SC Okay, we'll just get all the lights as bright as we can get them and use the standard interior procedures.

CAPCOM Roger, that sounds like a probably better way to go.

SC I was just thinking if we had more illumination like that that we could save ourselves a little time. Better pictures - that's a pretty nice slow ride, Don.

CAPCOM Roger. Okay, Charlie, are you on the loop, there?

SC Rog. go ahead.

CAPCOM Okay, on this battery compartment problem. The reason for it coming back up so rapidly right after you vented is that there is pressure built up in the batteries and when you vent the compartment the batteries simply then are venting to a very low pressure or see a very low pressure and they tend to vent very rapidly for a while until you get the pressure built back up and then they vent at a much slower rate.

SC Okay. Fine, that makes sense thank you, very much.

CAPCOM Rog.

SC Houston, 16. We're going through the presleep checklist if you're ready we'll send you the EMOD.

CAPCOM Stand by, one. Okay, go ahead.

SC And, Pete ya'll satisfied with our cyro configuration for tonight?

APOLLO 16 MISSION COMMENTARY 4/25/72 CST 22:22 GET 251:14 MC838/2

CAPCOM That's affirmative.
SC Don, do you want us to use standard high
gain procedures tonight?
CAPCOM That's affirmative, 16.
SC Okay, thank you sir.

END OF TAPE

CAPCOM Okay, Ken, the rates look good for spin up.
SC Okay.
CAPCOM And, Charlie, we'd like 1 more reading
on the battery compartment.
SC It's almost about pretty good, Pete - 24 about
235, I'd say now.
CAPCOM Okay, 235.
SC Yeah, it seems to just about stabilized.
I should say stabilized. At least the rate of increase is
very slow, now.
CAPCOM Roger.
SC Hey, Pete, ya'll want a memory dump.
CAPCOM Stand by one minute.
SC Did you say affirmative, Pete.
CAPCOM Stand by just a minute Charley.
SC Ken I'm going to AC2 on tel comm group

AC 2.

CAPCOM Are you ready for the memory dump Charley?
CAPCOM Charley we'd like to get the memory dump
and we'd like to keep the high gain until we get that.
SC Okay. Maybe I'm not up to speed. Do
we loose the high gain if I put group 2 to AC2?
CAPCOM That's affirmative. That's why I wanted
to wait till I'm on OMNI to make that switch.
SC I understand.
CAPCOM 16, we're starting to see some very low
SIM bay temperatures. We'd like to go ahead and get into PTC.
SC Okay.
CAPCOM And the rates are excellent right now.
SC (garble)
CAPCOM Say again Charley.
SC (garble) very low (garble)
CAPCOM Can't reach you Charley.
SC (garble)
CAPCOM Okay.
PAO This is Apollo Control at 252 hours 2 minutes.

The crew aboard Apollo 16 at the moment getting the spacecraft
spun up and it's rate of 3 revolutions per hour. The configuration
that they'll leave their spacecraft in during sleep period and
the crew has now completed virtually all pre-sleep activities
and they'll be ready to begin their sleep period and looks as
if they'll be right on the flight plan which calls for them
to begin an 8 hour sleep period in about 30 minutes. You've
heard several references to the battery compartment pressures.
Also earlier on previous shift there was some discussion of
a possible battery problem and looking into that the situation
we have reached a conclusion that the entry batteries in the
command module are intact behaving normally. There is no
problem. The earlier concern about the possibility of a problem

SC (garble)
CAPCOM Roger.
SC Houston, 16.
CAPCOM Go ahead.
SC Pete, are you satisfied with our antenna setup?
CAPCOM Put track mode to react and narrow beam.
SC Okay, you've got react narrow beam and high gain selected.
CAPCOM Okay. That's fine Charley. Thank you.
CAPCOM 16, Houston. Got about 3 or 4 more little small items for you here. First of all we'd like you to verify that you're going to use the OPS to bump the cabin up to 57.
SC Okay, Don. We will.
CAPCOM Okay. And Ken you look good on the biomed data. It's all checking out okay. And there's a couple items on the gamma ray we want to retract for 12 seconds and gain step ON up four steps.
SC Retract for 12 and gain step up for 4. Is that right?
CAPCOM That's affirmative. And let us know before you turn the voice subcarrier down.
SC Okay.
SPEAKER RETRO recovery. I hate to bother you about this service module but when - -

END OF TAPE

CAPCOM And 16, could we get you to complete the map out temperature to about 45 degrees. Looks like it's about 38 right now and that's going to be a little cold out when you get into PTC.

PAO This is Apollo Control at 252 hours 44 minutes. The crew aboard Apollo 16 has completed all of their presleep activities and the spacecraft appears to be in good shape now for the sleep period. The gamma ray and alpha particle experiments will be operating from the scientific instrument module bay during sleep. The command module pilot Ken Mattingly is wearing a biomedical harness and we'll be receiving heart rate data from him while the crew is sleeping. And the spacecraft is in the slow roll for passive thermal control. We have some updated figures on the predicted lifetimes for the lunar module Orion in lunar orbit and also for the particles in field subsatellite which was ejected from the scientific instrument module bay prior to the time Apollo 16 ignited it's service propulsion system engine to start the spacecraft on it's route back to Earth. The predicted LM lifetime is 343 days and the predicted orbital lifetime for the subsatellite is 192 days. We're in the process of a shift handover at the present time in Mission Control. Flight Director Jerry Griffin coming on now to replace the Flight Control team headed by Flight Director Don Puddy. We do not plan to have a change of shift press briefing following this shift.

CAPCOM Okay, 16. Your mapout temp looks good now.

SC Okay, Don. I was just going to let it see how it does. I just moved it to about the middle (garble) and the OPS is now reading 800 psi.

CAPCOM I understand. 800 psi on the OPS. Thank you.

SC That's affirmative. What else do you have before we call it a day?

CAPCOM Stand by one minute, but I believe that's got everything. Okay, Ken I guess that's it. You guys get a good sleep.

SC 66-2/3 % RDR. Who else is on down there with you tonight? Who is your flight director.

CAPCOM Say again, Ken.

SC I say, whose on with you tonight? Whose the flight director?

CAPCOM Don Puddy is on right now, we're getting ready to leave. Jerry Griffin coming on.

SC Ah, so. Okay. We're all glad you guys are getting off at a reasonable hour for a change. Although I just looked at my watch and I guess it's about 3:29.

CAPCOM Sorry about that.

APOLLO 16 MISSION COMMENTARY 4/25/72, CST 23:44 GET 252:36 MC-841/2

SC It's pretty reasonable by comparison
and appreciate all your looking out for us today.

CAPCOM Rog.

SC You're sure a big help in helping take
care of the things we did today while we were trying to
get things restowed up here. We still - you can see day
light now any how. So I'll see you folds tomorrow.

CAPCOM Alrighty now. See you in the morning.

END OF TAPE

PAO This is Apollo Control 252 hours 54 minutes ground elapsed time. Two clocks counting up to - - or counting down to entry and landing. 37 hours 28 minutes plus seconds to entry and 37 hours 41 minutes plus seconds to landing. Crew of Apollo 16 has turned off their voice downlink and presumably are closing up the spacecraft window curtains for a night's sleep. We'll take down the air-ground circuit at this time. There will be some television from the Descartes landing site area from the ground commanded television assembly. Starting at about 12:30 A.M Central. At 252:56 this is Apollo Control.

END OF TAPE

APOLLO 16, MISSION COMMENTARY, 4-26-72, CST 02:04 GET 254:56 MC843/1

PAO This is Apollo Control 254 hours 56 minutes
ground elapsed time. Apollo 16 now 35 hours and 40 minutes
away from splashdown in the Pacific, some 146,179 nautical
miles out from Earth approaching at a velocity of 4,503 feet
per second. Spacecraft weight at this time 27,349 pounds.
Apollo 16 crew has been asleep for better than 2 hours, some
6 hours remaining in the scheduled 8 hour rest period. And
at 254:57, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control 257 hours 55 minutes ground elapsed time. Apollo 16 homeward bound some 32 hours 41 minutes out from splashdown in the Pacific near the equator South of Hawaii. Apollo 16 crewmen asleep at this time. The only biomedical data coming from the command module pilot which shows his heart rate in the 40's - - mean heart rate in the 40's. Cabin pressure now 5.5 pounds per square inch at a temperature of 66 degrees. Spacecraft currently in the passive thermal control mode rotating very slowly about the longitude axis. 3 revolutions per hour maintain a thermal balance on all the spacecraft systems. Apollo 16 getting ever closer to Earth. Altitude now 138 160 nautical miles. Velocity continuing to build up. Now approaching at 4690 feet per second. Flight path angle, the angle at which the spacecraft enters the atmosphere. This is relative to the local horizontal at the landing site at splashdown point is now -6.6 degrees which is very near the desired flight path angle. Velocity predicted at this point from the tracking to be 36 196 feet per second. Spacecraft current weight 27 349 pounds. Crew has 2 and half hours remaining in their scheduled sleep period. And the gold team of Flight Controllers has about that long in their wake period. At 257:58 this is Apollo Control.

END OF TAPE

PAO This is Apollo Control 258 hours 48 minutes ground elapsed time into the mission of Apollo 16. Apollo 16 now 31 hours 41 minutes away from splashdown. Meanwhile in the central Pacific landing area, the Ticonderoga prime recovery vessel is some 85 nautical miles north of the splash point and steaming in that direction. Weather in the landing site is good at the present time. Cloud base at 2,000 feet, scattered, visibility 10 nautical miles, depending on how high you are. Wind is out of the east at 10 knots, 3 feet wave height. Splash point right now is predicted to be 44 minutes south latitude 156 degrees 09 minutes west longitude. That is approximately 1,310 nautical miles south of Pearl Harbor and probably 300 miles or so south of Christmas Island. Apollo 16 is now 135,707 nautical miles out from Earth, traveling at a speed of 4,750 feet per second. One hour and 39 minutes remaining of the crew's scheduled sleep period and at 258 50 and the current ground elapsed time this is Apollo Control.

END OF TAPE

PAO This is Apollo Control 259 hours 47 minutes ground elapsed time into the mission of Apollo 16. 42 minutes until wakeup. Reville for the crew. Spacecraft is presently 133 064 nautical miles out from Earth. Approaching at a velocity of 4816 feet per second. One of the first items after wakeup will be a flight plan update for the balance of the day's activities which include light flash observations, a press conference which will begin at 268:10 and run for 30 minutes with a group of questions being read up by the CAPCOM from the newsmen covering Apollo 16. The crew will also receive instructions on setting up a different form of passive thermal control in which the spacecraft axis is pointed in a slightly different direction. Instead of being normal to the plane of the ecliptic, the longitude axis of the spacecraft normal to the plane of the ecliptic. Spacecraft will be tilted over to point the SIM bay experiments to a different region of the galaxy. However the roll rate will remain essentially the same. At 259:49 this is Apollo Control.

END OF TAPE

CAPCOM Good morning, Apollo 16, Houston.
SC Morning, Tony.
CAPCOM Good morning up there. Say I think we may have driven your high gain into the stops, could you check on 225 the high gain flight 5 group 2 of one belt push it in.
PAO This is Apollo control in the early wakeup some 5 minutes early because of the high gain antenna apparently some minor difficulty.
SC And, can't move it.
CAPCOM Which ones were out?
SC There in.
CAPCOM Okay, John, on that high gain could we put it to pitch at minus 40 the yaw at 90 REACQ and NARROW.
SC Okay, that's where we are right now.
CAPCOM Okay, and we understand that no circuit breaker was popped.
SC That's correct. There was no circuit popped.
CAPCOM Okay, thank you.
CAPCOM And after you finish your post sleep up there before you stop PTC we'd like to update your checklist or flight plan. We've got a couple of changes on the PTC initiation, there.
SC Changes on the initiation before we stop, huh? Okay. Okay, don't blow our record, now.
CAPCOM Okay.
SC Your talking about the super gal, huh?
SC I'm ready to copy, Tony.
CAPCOM Okay. Okay, for the PTC initiations at 260 plus 44 and 264 01 we'd like to change the PTC procedures and the G&C checklist, keep the PTC coning within a plus or minus 3 degrees in pitch and yaw. Okay, if we could go to the G&C 8-2.
SC Okay, why don't you just tell me first what the general scheme is. How you going to do that while we're getting the book out.
CAPCOM Okay, fine. We'll use your BD roll, but we'll keep the pitch and yaw jets D3, D4, C3, and C4 jets on. And we're going to leave the roll jets on, too.
SC In other words you want this thing to remain in attitude control throughout the PTC.
CAPCOM That's right.
SC Oh, delete the P from PTC.
CAPCOM Your right. I guess we'd call it ATC, now.
SC There you go. How about AGS you got to figure out what that stands for, but it's better. You're a scientist that shouldn't be hard, Tony.
CAPCOM Active galaxy scan.

SC You want us to try - that's very close.
You get a 95.
CAPCOM (Laughter) I'm going to quit your course.
SC Oh , it's right down there now. How you
doing on the high gain? I don't know if you shifted to it
or not. Looks like where you could pick up, now.
CAPCOM We're going to try it down here. If we
loose the comm we'd like you to go ahead and try to acquire
it yourself.
SC Okay.
CAPCOM And let me know when you're ready for G&C.
SC I'm ready.
CAPCOM Ken, Houston.
SC Go ahead.
CAPCOM Did you acquire or did we do that?
SC You did that.
CAPCOM Oh, good show. Okay, in the G&C check-
list, perform steps one through four after the rates are
damped in step 5 under the auto RCS select use BD roll and
D3, D4, C3, C4 jets and you might just sort of write this
in to the side - not cross anything out because later on
you'll go back to the nominal procedure.
SC Rog, understand.
CAPCOM Okay, and step 6. Use a minus 0.3
0 degree a second and 3.0 in NOUN 79.
SC Okay.
CAPCOM And delete the last two steps.
SC As long as we're remaining active - as
long as we're remaining active why are we trying to damp the
rates, Tony?
CAPCOM Okay, I guess they're not going to let you -
they're not going to ask you to damp it down too long. They're
just going to get it down to a reasonable rate and then start
it up.
SC Okay.
CAPCOM Okay, and delete step 7.
SC Rog, understand.
CAPCOM Okay, and a note here for PTC attitude
at 275 plus 50 uses a normal PTC procedures. Okay, now we
can go to the updating on the flight plan.
SC Okay what you're really saying except
for this - these two special things we're just going to do
what we always do, right?
CAPCOM That's affirmative. I just say it the
long way.
SC Alrighty.
CAPCOM Okay, from 262 plus 00 to 26220 we're
going to schedule in some geology debriefing for EVA 3 for
John and Charlie.

END OF TAPE

SC (garble). Okay.
SC Okay Tony, I got that written down.
CAPCOM Okay fine. 26430, change purge 02 fuel cell 1 to 02 fuel cell purge and then right under that cancel out all that mass spec exercise between 26435 and 26445. Essentially, all you're going to that all out if anything 02 fuel cell purge and then ended up with an H2 fuel cell purge.
SC Okay.
CAPCOM Okay at 26700.
SC Go ahead.
CAPCOM Change the high gain PITCH and the YAW to PITCH 9, YAW 257.
SC Okay.
CAPCOM From 268 10 to 26840. You are going to love this. Schedule of TV press conference.
SC You knew we had it stowed didn't you?
CAPCOM We just waited (garble) away.
SC You knew we took cards (garble) yesterday.
SC Okay. Okay.
CAPCOM Okay 268 30 delete charge bat A.
SC That's done.
CAPCOM Okay.
SC Go ahead.
CAPCOM 269 23, delete alpha particle X-ray cover close. X-ray standby and VERB 49 maneuver to thermal attitude, delete that whole block.
SC Okay.
CAPCOM Okay delete all activities between 26955 and 27010. Mass spec RCS jet test.
SC Go ahead, Tony.
CAPCOM Okay at 27050, change your VERB 49 attitude to 090 180 010.
SC Okay 090 180 010 and 50 50.
CAPCOM Okay and your high gain attitudes there are PITCH minus 75 YAW 40.
SC Minus 75 and 40.
CAPCOM And note that your alpha particle and X-ray cover open and X-ray is on throughout the Skylab contamination photos. So you just don't worry about that.
SC Okay.
CAPCOM At 27115, change your VERB 49 attitude 032 299 010.
SC Okay.
CAPCOM And your high gain PITCH minus 40, YAW 229.
SC Okay minus 40 and 229. And an attitude of 032 299 010.

CAPCOM Okay at 27150, change the ROLL in the
VERB 49 attitude to 140.
SC Go ahead.
CAPCOM And the high gain is PITCH minus --
SC From 141 to 140?
CAPCOM Right. And the high gain's PITCH minus
47 to YAW and YAW 59.
SC Minus 47 and 59.
CAPCOM Rog. At 272 10.
SC Okay.
CAPCOM VERB 49 attitude 088 082 041 and the
high gain PITCH minus 49 and YAW 220.
SC Okay that's 088 082 and 041 and a
minus 49 and 220 on the gain.
CAPCOM Rog. At 273 delete X-ray on.
SC Okay.
CAPCOM At 273 30 delete alpha particle X-ray
cover open.
SC Okay.
CAPCOM At 274 15, on your VERB 49 attitude.
SC All right.
CAPCOM Your attitude is 164 134 035, high gain
is minus 23 and 101.

END OF TAPE

SC -- - 164 134 035 minus 23 and 101. Adjust beam -

CAPCOM Okay. And that's all I've got.

SC Okay.

SC Oh, shoot, Tony, you can do better than that. Haven't you got any more?

CAPCOM Well, we're - I'm sure FAO will have some here in a few minutes. But that's guaranteed all until you get back.

SC Oh, okay. Well, good. I won't see FAO stopping this quick.

CAPCOM And I guess we don't know why that high gain hung up while you were asleep. We're going to just continue turning all procedures.

SC Okay.

PAO This is Apollo Control. Apparently, the crew of Apollo 16 brought eyed and bushy tailed on the first callup. Flight plan updates read to the crew included a geology debriefing for Young and Duke on EVA-3. That's scheduled from ground elapsed 262 to 262:20. Press conference with onboard television scheduled now at 268:10 through 268:40, duration of 30 minutes. The crew has also been instructed on procedures on setting up a - what is called "super galactic plane passive thermal control." Although they tended to call it active thermal control. We're up live with the air/ground circuit until the next rest period. At 260:46 this is Apollo Control.

SC Hey, Tony, I'd like to do a VERB 46 and I think that was one of the ones that they had on the list of things that I should do.

CAPCOM Okay. I'll check on that.

SC Could you see what conditions I need to satisfy in order to do that?

CAPCOM Copy.

SC Like - I'm not sure whether I've got a switch idle position, or what here, but it looks like the DAP isn't running. And I don't really understand why.

CAPCOM We're working on it.

SC I may have something out of configuration. I just don't see it right off hand.

SC I did find the switch.

SC How about our sight where the (garble) where we can take them back off.

SC Remembered it.

SC Did John forget to turn off the ground switch.

CAPCOM Yes, you can cycle the cryo pans and our G&N says everything's all right here.

SC Okay. They're cycled. And we - I have the (garbled) selected one, I'm getting ready to do a GDC aline

APOLLO 16 MISSION COMMENTARY, 4/26/72, 7:47 CST, 260:40 GET, MC-849/2

SC when you're - when you're asking for these
other things I left it there and the needles weren't centering.
So I was - I overlooked that one.

CAPCOM Thank you.

CAPCOM And Ken you're go to start PGC any time you're
ready. You're down to (garbled).

SC Okay

END OF TAPE

PAO This is Apollo Control Houston, at 261 hours ground elapsed time. We've had a change of shift in the Mission Control Center. Phil Shaffer has now come aboard as the flight director, and our CAPCOM at this time, Henry Hartsfield. We'll standby and continue to monitor our conversations with the crew of Apollo 16. We're at 261 hours ground elapsed time, and this is Apollo Control Houston.

SC Okay, and the ATC is operating.

CAPCOM Okay.

PAO This is Apollo Control Houston, at 261 hours 3 minutes ground elapsed time. We now show Apollo 16 at a distance of 129,502 nautical miles away from the earth. Our CAPCOM, at least through the geology quiz, will be astronaut Tony England. Following the quiz, he will be replaced by Henry Hartsfield, who normally works this shift. Both are in the control center at the present time, and we're apt to hear from either in conversations with the crew of Apollo 16. We're at 261 hours 4 minutes ground elapsed time, and this is Apollo Control Houston.

SC Okay, Houston. Standby with the crew status report.

CAPCOM Okay. Go.

SC Okay. On the commander, working on day 11 to keep it in sequence with the clock around here, A1 is down in the valve of the ship stowed, A3 is 7 hours, day 4 is not. For the CMP, B1 15067, B3 6 and a half, B4 none. For the LMP, C1 21159, C3 is 6 and a half, C4 is none.

CAPCOM Okay, we copy that.

SC And all those sleeps were good to better.

CAPCOM Good to better, okay.

PAO Apollo Control Houston, at 261 hours 11 minutes ground elapsed time, that was John Young passing along the crew status report to CAPCOM, Tony England. We show Apollo 16 now 129,121 nautical miles from the earth, and traveling at a speed of 4918 feet per second.

SC Using the day 10 meal, to try to help clean out the B2 so we can stow the mapping camera film in there, and on that day for breakfast, the - on the CDR's, scratch the fruit cocktail.

CAPCOM Okay.

SC For dinner, scratch - for lunch, scratch the turkey and gravy and substitute beef and gravy and add an orange drink, and then you could either scratch - we never got around to eating supper because we missed lunch and we substituted - we substituted supper, or I mean lunch for supper.

CAPCOM Okay, copy that.

END OF TAPE

SC And on the CMP for breakfast scratch the fruit cocktail, the sausage patties, and the spiced fruit cereal.

CAPCOM Okay.

SC For lunch, scratch the vanilla pudding in a can, the white bread one, and the peanut butter, spread the CWP and add a chocolate bar and coffee.

CAPCOM Okay.

SC For the LMP, for breakfast, don't scratch anything. For lunch, or supper, your choice, scratch the turkey and gravy and add beef and gravy and scratch the vanilla pudding in a can, the white bread one, and the peanut butter. Okay?

CAPCOM Okay. We copy that. Ken didn't eat his peanut butter, huh?

SC He couldn't find it after we cleaned out - after we cleaned out that locker to stow the mapping camera cassette, the peanut butter mysteriously vanished.

CAPCOM Ah, understand. Charlie stole it.

SC We're looking for the - we're looking for the guy with the key to the peanut butter locker right now.

CAPCOM You know, of course, you're going to have to eat up all that food on the day you lost.

SC How about if we do that aboard the ship?

CAPCOM And Apollo 16, the gamma ray shield on per the flight plan.

SC Okay, she's on.

CAPCOM Copy.

CAPCOM Apollo 16, Houston. If one of you have a chance would you read out the battery compartment pressure reading?

SC 2.5 and holding.

CAPCOM Okay.

SC Okay. Ken said he looked at it several times during the evening and it's been there most of the night.

CAPCOM Okay, fine.

END OF TAPE

CAPCOM Apollo 16, Houston.

SC Go ahead.

CAPCOM Okay, I tried to get Hank to send this up, but he wouldn't touch it either. I guess we'd like John on the biomed today and Charlie on it tonight. And, just a reminder for today we'd like items 5 and 6 in the crew status reported.

SC Yeah, we did we're working both of those problems in.

CAPCOM Okay, and we'd like to scrub P52 at 262:30.

SC That was the only thing he had he's looking forward to all day and you scrubbed it.

SC You know how to hurt a guy don't you?

CAPCOM We'd just trying to give you some time to hunt for the peanut butter.

PAO This is Apollo control, Houston at 262 hours ground elapsed time. We now show Apollo 16 at a distance of 126 742 nautical miles away from the earth and now traveling at a speed of 4982 feet per second.

PAO Apollo control, Houston 262 hours 3 minutes ground elapsed time. We're standing by now for the geology.

CAPCOM Whenever your ready for the geology we'll on with that.

SC Yeah, we're ready.

CAPCOM Okay, our first question here on the portable magnetometer. I forgot to ask you it was my omission. I was wondering what the temp label on the electronics read. If you remember.

SC Tony, you got to be kidding.

CAPCOM I was afraid of that. Okay, and for Charlie, there, we'd like to verify that on the third EVA when he was driving out to station 11 with the polarizer on that he used nominal camera settings. He didn't allow for the polarizer.

SC I did just what was on the top of the camera, Tony. Filter I used 56 at 125th in the right position.

CAPCOM Okay, that's fine that's great that's what we needed to know. Okay, the next question we'll get when we get the rocks back, but I think - well maybe the best way to do this is to describe a theory that's coming up as a result of the rocks that you saw there. It looks as if - a possibility is that an older theory that was discarded a few years ago may be the right one. That the Cayley is an outer fluidized ejecta from Imbrium. Fra Mauro would be an inner ring and then Imbrium sculpture would be outside of that and then the Cayley would be sort of slosh

CAPCOM that filled up all the valleys further on out. But some of the questions that the geologists are pressing here is something that might help them find that. And a lot of it is that they just can't wait for the rocks to get back. But anyway, station 11 you described some rocks you thought to be tough. Looking back at station 5 and 6 after seeing these at 11 do you think you might have seen the same kind of rock there. What we're thinking is where you described the square crystals and the needle like crystals in clast and also in the same question were these crystals by themselves or were these - I mean were the clasts single crystals or were the crystals in clast?

SC Recalling station 11 the rocks the big rock in particular was a two rock breccia, I feel. And within the - within the blueish black matrix which made up one clast - one of the rock types there were needle like crystals in that. And the white matrix also had crystals in it.

CAPCOM Okay, and how - how did these rocks compared to what you saw at station 5 and 6.

SC Tony, I'm afraid I'm not going to do any better with the answer to these questions than I do on an average field geology trip where you got 10 stations. The rocks - you know the rocks that we're picking up at 5 and 6 that was a long time before station 11 and -

CAPCOM Understand - don't worry about it.

SC And I can't remember what the dang rocks look like to be honest with you.

CAPCOM We're gonna (Garble).

END OF TAPE

CAPCOM Okay, I'll try to stick here to questions that were impressions, and we're going to get the rocks back anyway. I don't really think there's any point in pressing, pressing with questions where we'll get the answers in a few days. I found on EVA #3, you noted one to 5 meter craters, and then 10 meter craters going north and you called them secondaries. We're wondering what evidence there was that, if any, that they came from North Ray. Do you think you saw any secondaries from North Ray, and if so, where would they be, and could you compare them to the size and character of the South Ray secondaries.

SC There was out around Palmetto, there were a couple of craters, if I recall, I don't know exactly whether it was Palmetto or not, but as you're going out that way, there was some craters with some blocks in them, and that's the reason I call it secondary. They were not as fresh, in fact, craters going toward North Ray were a lot more subdued than the craters going down to Stone Mountain. The North Ray had, something that had either they were older or something, but they were a lot more subdued and there was less blocks around. But we did have one or two that had some blocks in them and that's why I called them secondary.

CAPCOM Okay, were the blocks as angular as the ones you described from South Ray.

SC In general, our impressions were no.

CAPCOM Okay. As you were coming off of, and going up into North Ray area, did you give a guess at the relative proportions in the size and shapes of the white and the dark rock. In other words, was there a change radically outward from North Ray?

SC Yea, this is just an impression, Tony, but I'd say that the - that the dark rock was less prevalent as you went outward, generally speaking, as you went away from the crater.

CAPCOM Okay.

SC I could be 100% wrong on that, but we sure drove over a lot of - in the regolith there in particular. The upper layer in regolith which contained these, I mean the ejecta blanket, which contained the upper layer in the ejecta blanket contained a lot of boulders with just their heads sticking through, and those were the ones I was looking at cause I was trying to go around them. And they, I don't ever remember seeing a dark breccia-like rock in those boulders.

CAPCOM Okay, sounded good. And that very large rock you sampled up there, Charlie, you mentioned there was white and dark rock in the one rock. Could you describe the contents. Was one contained in the other, or did the contact again or meander through the whole rock?

SC Side, it sort of just meandered through, Tony. It was a, it was a, again I guess a two-rock breccia where it was the white in the black and the clast were very large, up to a

SC meter size. I think the predominant rock was black. At least the overall color gave you a black, but when you looked closely, you could see white clast in it. So the, in the contact it just meandered, I think we've got a couple of close-ups of how the contact is meandered through. It was sort of an angular clast. In the predominately blackish matrix.

CAPCOM Okay, the white rock was it, that was in this big boulder, was it like the white rock that you sampled to the southwest of where you parked the rover.

SC Yes, it was all, yes.

CAPCOM Okay.

CAPCOM Incidentally, that shadowed cone that you saw on the big boulder. Did it, did the surface on the cone go right through the clast, or did the clast poke out kind of like nodules on the cone.

SC Well, they - no they didn't. The shadow cone was in, was fortunately, or unfortunately, depending on your point of view in, in the black matrix, and it was, it was a crystalline rock where the shadow cone occurred.

CAPCOM Okay, understand. Okay, now that you've seen both North and South Ray ejecta blocks, could you say a little bit about the ray material in the area from the LM to Flag. Do you feel that all that material is characteristic of the bigger ray blocks that you identified near either North Ray or South Ray.

SC Okay, I -

CAPCOM Go ahead.

SC I guess my impression might be that some, in some places we had some of each, but most of it was from South Ray. And around the LM, I'm - we saw once we got going toward North Ray, those - that material around the LM, by gosh, the breccias and I collected several of them at that last station, in hand specimens, some of them were like the material we got out of South Ray, clear of South Ray blanket, and, but several of them were from North Ray. At least that was my impression.

CAPCOM Okay, understand. We always had -

SC I'd say the most of them from South Ray.

CAPCOM Okay. We seem to have the feeling that the rocks you were describing in the LM area, were just some how just a little bit different than what you were picking up either down South or up North. I guess we'll get that all straight when the rocks get home.

SC Tony, I think that the breccias were different. We've been - maybe I going way out on a limb when I say this, but we've been collecting little fragments that have been floating around the cockpit here and looking at them, and they're crystalline, crystalline fragments that, with a little white powdery exterior on part of it, and it's chalky appearance. And to me, this is - was characteristic of the rocks, some of the rocks around the Cayley which, now I'm really leading to a tough

SC breccia but the matrix being the ash with these crystalline frags and the crystalline frags look just like the rocks, the crystalline rocks around North Ray. At least the black ones. At least the couple I found here floating around, and it's not to say that the fragments, there are some fragments from whitish rocks, but they were a little bit more difficult to see in this white matrix of what looks like tuff now, cause it's very powdery.

CAPCOM Okay, understand. Wonder if you could describe that, those letricles in that rock at station 13.

SC Well, it looked like, I call them drill holes. Let's see if John has a different word for it.

SC They look like those pipes that you see in rocks. Like Charlie said, they just look like drill holes.

CAPCOM Okay, understand.

SC And they were about a couple of, up to 2 to 3 centimeters across.

CAPCOM Okay.

SC In diameter, and perfectly circular. It appeared to me to be.

CAPCOM And how deep did they go. Could you tell me, did they go straight in or did they seem to meander around.

SC They seemed to go straight in and I couldn't tell how deep they were, because they only go in a - they disappear from sight. I didn't try reaching into any of them.

SC Tony, they were - there wasn't anything in them. You could just look in and you'd just - and they looked clean, and just like somebody drilled out the rock.

CAPCOM How about the orientation. Were they all perpendicular to the surface, or did they all have a preferred orientation?

END OF TAPE

CAPCOM - - at the orientation, were they all perpendicular to the surface or did they all have a preferred orientation?

SC I got the impression that they were parallel to the - to the surface. The rock was - as you stood and faced the rock, you could see these little holes sticking out at you that - with most of them parallel to the regolith.

CAPCOM Okay. How about when you went around on the other side. Did they poke out at you there or were the - what I'm trying to get a feeling is, did it indicate a top and bottom in the rock or did it just poke out all over the rock?

SC I'm - We don't - we only remember seeing them on one side, Tony, and that was the south side or the east side of the rock. The rock was facing - the side we saw them on was away from North Ray.

CAPCOM Okay. Understand.

CAPCOM Okay. And - Stand by.

CAPCOM Okay. Charlie, just before you left - or during the LM closeout time, you started to make a remark about the changing character between the regolith - between the LM area and Stone Mountain and somehow we got interrupted there and didn't finish your statement. I wonder if you could finish what you were going to say, if you happen to remember, can you characterize the difference in regolith between the LM area and Stone Mountain.

SC Standby by one on that one.

CAPCOM Okay.

SC Tony, I think that we're just sitting here trying to decide - recall, and I - right now the only impression is that you tended to sink in more up on Stone Mountain which could be downslope movement of the particles that - it was a just very loosely consolidated up there. Everywhere you'd step you'd sink in a couple of inches. And on the slopes around the LM it was the same way and even, in fact, where we landed. Out around the ALSEP site it was very loosely consolidated and as you walked you could - your foot would leave quite a imprint. And once we had pretty well turned over the surface around the LM and up on Stone, it would look like freshly raked ground to me. Stone Mountain - Smoky Mountain - or excuse me, North Ray wasn't like that at all. It was very thin regolith and as we'd come in it we had a tough time raking because it was so rocky right up - within a couple of centimeters at the top of the regolith. Over.

CAPCOM Okay. Understand. I think your downslope movement there on Stone was probably - probably right. Although that wouldn't explain why it was harder at 5 and 6 than at 4. Well, anyway. Next question here, on that half orange sized rock that you put in the LPM wonder if you could estimate how

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CAPCOM common that type rock was around.

SC Well, John picked up one just like it up on - it was a grab sample up on Sto - Yes, Stone Mountain and it was one of the crystal rocks with that sugary crystalline texture to it. Yes. And it was one of those whitish rocks that was a little dusty. I think it's fairly common. We'll just have to see when we get the samples back, but it was my impression it was one of the three predominant rock types there.

CAPCOM Okay. Understand.

CAPCOM And the soil at Station 8, was it white underneath the top surface like you described up at Station 4 and a lot of other stations.

END OF TAPE

SC We kicked - we kicked some of that and I -- I can't remember whether it was or not it (garble) I think it -- anyway we sampled the soil sample there and it's in the -- it's in the box somewhere, but I can't -- I certainly can't remember whether it was a -- white underneath or not.

CAPCOM Okay understand. And just subjectively. Could you compare, now that you've been up fairly close to Smoky and on Stone, could you compare the two structures?

SC They looked the same to us.

CAPCOM Okay. Well that's all of the geology.

SC In the -- Okay I wouldn't be surprised but what they aren't the same. When Ken and I and Charlie looked at it -- this real low sun angle. I guess that's -- as far as geometric form, it's certain look it was the hummocky material from the Descartes region is the way it looked. Right across the Smoky -- right through that whole region it looked like a single unit in the -- and I guess that would be my interpretation of it at this point. But it sure speculation, but I would guess at it. I wouldn't be surprised but which we don't find a lot of these rock types on one region very close to another region being about the same.

CAPCOM Okay understand. --

SC Tony, that was -- I was just going --

CAPCOM Go ahead, Charlie.

SC To add to that I was just -- I had the same impression. I'm looking at the, the South Ray with a black and white streaks up the wall -- up on the interior of the crater and also at Baby Ray, being very stark in contrast. And then in North Ray having that same impression, but more subdued. And the rocks appearing to be very similar -- I think there's a good lateral in which you guys can demolish this when you analyze the rocks, but right now my impression is that the -- the two craters penetrated are very similar -- are two very similar rock units, the white and the bluish black.

CAPCOM Okay understand. The reason for a lot of these questions, and we know the answers are in the rock boxes and bags there that we'll all get when you get home. But there's a lot of interest since the model -- the model that we have of the whole area is being changed because of the high aluminum silicone ratios and because of all of your rock descriptions there. And -- (garble). There's a lot of push here to reformulate a model. The press is kind of pushing and you'll probably get some questions this afternoon in your press conference. I was wondering if there's anything you wanted to ask the geology team about this new model since I don't think you'd ever been briefed on it.

SC No I'd sure never heard it was slosed
from the Imbrium to Cayley.

SC I think it's premature to be making those
kind of things, Tony. And I would like to wait until we get
all that data in and take a look at it. It's just too soon
to be on -- on heresay and not having the real evidence and
not having the -- all the data analyzed. It's too soon to
be making any major conclusions about the region. It's just --
I can't see how you could do that.

CAPCOM I sure agree with you John. But you know,
everybody's -- everybodys excited and trying to press with it,
but anyway I thought you might want to hear a little bit about
that, if you're going to be asked on it this afternoon. That
isn't -- now of course that isn't to say that anyone's saying
that Camp plateau or Descartes Highlands are slosed. It's just
the Cayley part. Anyway that's all, that's all we have here
if you want to press on that.

SC No I don't see any coming to that con-
clusion this quick without any evidence Tony. It's -- it'd
be nice to do that, but I -- boy I would not press for that
sort of thing this early in the game. And I wouldn't answer
questions to anybody to mount to anything on that kind of
stuff because that's too speculative.

CAPCOM Okay.

END OF TAPE

SC ... see anybody to amount to anything on that kind of stuff because that's too speculative.

CAPCOM Okay.

SC In other words it ain't good science.

CAPCOM Yeah, John, I think your right on and I hope they heard you in the background because I think I said the same thing this morning. And we have a slight change in the flight plan at 264:10. We'd like to change the NOUN 79 deadband to 2 degrees.

SC Okay, the NOUN 79 changed to 2 degrees at 264:10.

CAPCOM Rog, and I'll see ya'll tonight. I'll come back and tuck you in.

SC Okay Tony, thank you.

CAPCOM Thank you.

PAO This is Apollo control, Houston at 262 hours 31 minutes ground elapsed time. Apollo 16 now 125 279 nautical miles away from the earth and traveling at a speed of 5 022 feet per second. That was Tony England closing off his conversation on geology with the crew of Apollo 16. Our capcom from here on will be Hank Hartsfield. We're at 262 hours 31 minutes this is Apollo control, Houston.

CAPCOM Apollo 16, Houston.

SC Hello.

SC Go ahead.

SC Henry good morning to you.

CAPCOM Good morning. Like to give you a little change here or an addition I guess at 264:50 waste water dump says there we're suppose to specify the percentage and that's 35 percent. However, we'd like to call the start and stop - start and stop of that maneuver. EECOM would like something to do this morning.

SC Okay, your going to put us in attitude and do a midcourse correction with it.

CAPCOM I don't guess we need that.

SC Hey Henry, tell EECOM we got some good pictures of a dump when we were station keeping up here while ya'll were deciding whether we could land. Ken did his dump and we had perfect lighting for it and so we got some DAK film of it and it was really coming out of there. Not only that he had perfect postion on the station keeping when he started to dump and it just pushed him right over - it just pushed him right over out of plain.

CAPCOM Hey, I bet that was pretty too, wasn't it?

SC Yeah.

CAPCOM 16, Houston. I've got two deletions in your flight plan.

SC Hey, there you go. Just a second. Okay, go ahead.

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CAPCOM Okay, at 266 hours.

SC 266 hours, go.

CAPCOM Roger, delete gamma ray shield off. And a little further down there about 266:15 delete that whole line to where it refers to the gamma ray gain step all et cetera.

SC That's deleted.

CAPCOM Okay, and at 268 hours at the top of the page - page 374.

SC Go ahead.

CAPCOM Delete that gamma ray comment.

END OF TAPE

SC Okay, go ahead.
CAPCOM That's all of them for right now. Thank you a lot, fellows.
SC Okay.
CAPCOM Later on during the day, we're going to do some of these gain steps, but we'll call them real time.
SC Okay. We'll be awaiting your call.
Or where else would we be?
CAPCOM Roger.
PAO This is Apollo Control, Houston, at 262 hours 43 minutes ground elapsed time. Apollo 16 now 124 694 nautical miles away from the earth. Velocity now shows 5038 feet per second.
CAPCOM Ken, sometime when it's convenient and anytime you get to it, we'd like to get a film status.
SC Okay, Henry, we'll -- thank you.
CAPCOM No rush on that, Charlie, just whenever you work it in.
SC Okay. You mean you wanted to pour out every magazine and see how it's doing or what do you want?
CAPCOM Let me see how detailed they want it.
SC And ask why.
SC Cause we got some of these things stowed where you wouldn't believe. It's not going to be too easy. We're going to have to take the entry stowage apart to get at them.
CAPCOM We don't want to outstow anything if he's got it written down up there somewhere, that would be satisfactory; whatever his record show; if he doesn't, let's just forget about it.
SC Okay, understand. Hey, Henry?
CAPCOM Roger.
SC What are you looking for?
SC What are you looking for, Henry. Maybe I can help you. If you're looking for mags and have film on them, I can -- that may not be so hard to track down, but -- do you just want to know what pictures we took?
CAPCOM We got an antenna switch coming.
CAPCOM Ken, I haven't gotten a real satisfactory answer on this. If I had the dishes for the photo lab, I just kind of want to get an idea of your usage, but the way it looks to me, I wouldn't do anything special unless you got it written down there somewhere.
SC Okay, Henry. You can tell the photo lab that they're in real trouble cause they're going to be developing film for a long time.
CAPCOM Okay.
SC Most of the 70's are dark - already exposed

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SC no, or maybe like 10 frames or maybe an inch
or something, and the 16's, I really don't know what their
status is - and I have to go through and look at each mag,
it's my impression that most of them are only partially
used. There's about four that I can think of that are
empty, and we'll know all that as soon as we get on the
ship.

CAPCOM Okay, that's good enough, Ken.
SC Thank you, sir.

END OF TAPE

CAPCOM Charlie, your better half says that she would like for you to bring your mustache home with you.

SC Tell her I'm not going to do it.

SC Really, what she said would she be tickled if Charlie brought his mustache home with him.

CAPCOM Rog.

SC I can't wait to shave this off. We've had a little failure with this shaving gear and that our - been our problem.

CAPCOM Roger. I understand.

SC Hey, Henry, I got the biomed hooked up now. Ask the friends on your left there how it looks.

CAPCOM Okay. Looks good.

SC Okay.

SC How does it feel.

CAPCOM (laughter) Rog.

PAO This is Apollo Control, Houston, at 262 hours 55 minutes ground elapsed time. Apollo 16 now 124 098 nautical miles away from the earth. Velocity now reads 5055 feet per second.

SC Hey, Henry.

CAPCOM Yes, sir.

SC Can you tell us if we have the tape recorder running onboard in a forward direction so we can record on it. And looks like we need about an hour's worth of tape. We're are they in a playback cycle or what are they doing.

CAPCOM Okay, I'll check it, Ken.

SC Thank you.

SC We're going to start checking these light flashes.

CAPCOM Okay. The tape recorder is in rewind and as soon as we get an antenna switch we'll start it off for you.

SC Thank you.

SC Okay.

SC I still think these things are manufactured by the same guy that makes the Emperor's clothes.

CAPCOM (garbled)

SC I don't believe it. They're everywhere. They're everywhere.

CAPCOM 16, your tape recorder is running forward.

SC Thank you, Henry.

CAPCOM 16, Houston. The light flash folks request that if you see one of those things to identify yourself when you call the mark so they - if the tape is bad, they'll be able to still tell who made the mark.

END OF TAPE

SC Okay.

CAPCOM Apollo 16, Houston. The PIs say that you should be calling your marks also down on the loop - down on the air to ground.

SC Yeah, I think (garble) Charlie's seen about 7 or 8.

CAPCOM Roger.

SC There just not coming out too well today, Hank.

SC Mark, there's one, Henry for you right eye that's Duke on the bottom - bottom of the right eye is a little bright dot.

CAPCOM Roger.

SC Mark, in an outbore of the left eye Young a dot flashed that terminated toward the center.

PAO This is Apollo control, Houston at 263 hours 30 minutes ground elapsed time. You heard that report that both Young and Duke have seen the light flash. The crew of Apollo 16 now going through the light flash observations experiment. This is a controlled experiment during the transearth coast in an effort to correlate light flashes to incident primary cosmic rays. Ken Mattingly, is wearing a mulchin plate device on his head called the Apollo light flash moving emulsion detector.

SC The center right of the right eye, Young.

PAO Young and Duke wear eye shields.

SC In the upper left center of the left eye, Young.

PAO We're at 263 hours 31 minutes ground elapsed time. Apollo 16 now 122 335 nautical miles away from the earth.

END OF TAPE

SC Mark. Light streak in the lower part of the left eye.

SC Mark. Duke right eye. Upper center. A thin white streak.

SC Mark. Young and in the upper right eye, a couple of streaks from, looked like they were going from left to right. out at about 2 o'clock out.

SC Mark, Duke. Bright dot lower center right eye.

SC Mark, Duke. Right eye upper outboard. A bright dot.

PAO This is Apollo Control Houston, at 263 hours 42 minutes ground elapsed time. You hear the crew of Apollo 16 continuing with the flashing light experiment, and we now show the spacecraft at 121,761 nautical miles away from the earth, and traveling at a speed of 5,121 feet per second. Continuing to monitor, this is Apollo Control Houston.

SC Mark, Duke. Upper right eye - right eye upper center. A bright dot.

SC Mark, bright dot, very center right eye, Duke.

SC Mark, Duke. Upper right eye. A fuzzy flash.

SC Mark, Young. A streak at the top of the right center of the right eye, and it's going from - it's going out the top.

SC Okay, Hank. The first part of that - I was looking out the plus X apt, turnover on my right side and I'm looking out the Y axes now. I'm 1 to 5, and see if that's going to make any difference.

SC Okay, Hank. On the first part of mine, I was the first 30 minutes, I was right side up in the alley B with my head against the OPTICS covers and now I'm upside down in the alley B with my head against the OPTICS covers to see if that makes any difference.

CAPCOM Roger, copy.

SC Mark. A faint white dot on the left eye lower inboard, Duke.

SC Mark, Duke. Lower right eye, a faint fuzzy flash.

SC Mark, Young. Left eye, a streak going from top to bottom in the outboard part of the left eye.

SC Mark, Duke. Right eye lower center. A bright dot.

SC Mark, bright dot, upper right eye, Duke.

SC Mark, left eye, bright dot, Duke. Outboard.

END OF TAPE

SC Mark, left eye, bright dot Duke outboard.
SC Mark, Duke a fuzzy flash in the upper
left eye simultaneously with a bright dot in the right eye.
SC Mark upper left eye little faint dot,
that was Duke.
CAPCOM Apollo 16, Houston. We show your alpha
med period up.
SC Okay.
CAPCOM And 16, when you get ready to maneuver
to this new attitude, if you don't have bravo 1 enabled your
present jet configuration is okay.
SC Okay, Hank, I'll check it. That new
attitude I went to was great I think I almost went to sleep.
CAPCOM Roger, and I gather that atmed must be
a pretty affective shield. I didn't hear Ken say anything.
SC He wasn't suppose to use it. We already
did that on the outbound leg.
CAPCOM Okay.
SC He was doing something but it was all
audible.
SC Hank, what was the jet you wanted to have
me turn off.
CAPCOM Roger, bravo 1 so we won't fire in the SIM
bay. If you use bravo 2 and delta 1 for roll you'll be okay
just to leave that configuration and maneuver on to the next
attitude.
SC You want to use bravo 2 and delta 1. Is
that affirm?
CAPCOM That's affirmative.
SC Okay, Hank. That's not the jet configura-
tion they gave us this morning because I did have the SIM
bay jets - no, I'll have to look up those jets I had this
morning. Bravo 1 was one of the ones I had turned on.
CAPCOM Roger, we understand that Ken. The
reason is that when we stop the PTC the - we're in this con-
figuration you had, you'd have to use bravo 1 to stop it and
it would fire into the SIM bay. It probably never fired
during the PTC.
SC Hank, this one you want to do is a normal
PTC or do you want to use this one as the enabled jet version.
CAPCOM Rog, Ken we'd like to do it in that same
procedure that Tony read up to you this morning. And for the
next one at about 275:50 we'll go back to the regular procedure.
SC Okay, and you want to use the same jets
that Tony read me this morning.
CAPCOM Roger, and those I guess should be the
ones you have enabled now.
SC Except I got - this morning I had all
BD rolls enabled.

CAPCOM Okay, we'd like to start up in single
jet which is what you have now.

SC Okay, I'll use the jet configuration I
have now, then.

CAPCOM Roger, and I guess - did Tony read you
the change that we wanted a 2 degree deadband?

SC Yes sir.

CAPCOM Okay.

SC And, how about the rate. Now he read
me .3 this morning ...

END OF TAPE

SC Yes, sir.

CAPCOM Okay.

SC And how about the rate. Now, he read me .3 this morning, and normally we can do .4 too -- I take it .3 is what you're after.

CAPCOM Let me double check that one. Okay, .3 is the correct rate.

SC Okay.

CAPCOM And, Ken, when we get to attitude, we'd just like to hold that before you start the P20 so we can dump the tape recorder.

SC Okay.

PAO This is Apollo Control, Houston, at 264 hours 12 minutes ground elapsed time. We now show Apollo 16 at 120 287 nautical miles away from the earth now traveling at a speed of 5163 feet per second.

CAPCOM Ken, we need to get the high gain. I guess we need you to do a manual roll about 30 degrees left.

SC Okay.

CAPCOM And in regard to the urine dump coming up, the doctors think they see a correlation between the urine dump times and the dump port temperature. So, just to see if that really works, and if it does work, we might be able to get rid of all of this recording stuff. We'd like to identify which bags you are dumping and give us some mark at start and the end of the dump.

SC Run that one one more time please.

SC Maybe you guys don't understand the problem, do you? I can't believe that. We all dumped the urine into the same bag.

CAPCOM Okay, give us a start and stop.

SC If it's -- yeah, but Hank, we all dumped it into the same big white bag and then after that gets dumped over to the side -- is that what you want? A total volume from all three of us?

SC Did you get my last, Henry?

CAPCOM Roger. They still would like to know the start and stop time.

SC You're our guest.

SC What do you start or stop of what? You know, we let this thing purge and line out and we let it sit there until we're sure everything's all cleaned out and afterwards, to make sure we don't plug things up. I guess we can tell you when we do each step, but we don't really know when those bags are empty.

CAPCOM Well, that would be my guess also, but

CAPCOM can you guess at it? Okay, if you can't, forget it.

SC Okay.

SC Okay, Henry. Here's what we've been doing with the urine.

SC Is this attitude okay for you, Hank?

CAPCOM Roger.

CAPCOM John, could you repeat what you said to INCO cut the antenna that time you started.

SC Houston, is this attitude okay for the high gain?

CAPCOM Affirmative. It's a good attitude.

SC Okay, now. Let me tell you what we've doing with this stuff. We've been using the jimmy bags and then dumping it into a big white bag and it's all in there now all mixed together and nobody knows whose is whose and further more, we don't know when we dumped that big white bag. We know when we started to do but we don't know whenever it finishes because you can't see the inside of the bag. You just don't a feel for that. So, what you just do is you just let it run till you think you ought to quit and look and see if you got particles on the outside, and even after you quit, there's still particles on the outside.

CAPCOM Roger, copy, John. Why don't we forget about that?

END OF TAPE

SC Okay I'd be glad to do it if I thought it would give you any data, but I can't see how it'll give you anything you could use.

CAPCOM Okay John. What we're trying to do is find some way to make the procedures a little cleaner on Apollo 17. So they think they can get some useful data out of this and if you can just give us a mark when you start maybe they from the temperature curves can tell just about when it ends. They got a -- they're trying to get a calibration on how the temperature of the port changes during the dump.

SC Yea, but are you sure, for example that we don't have a least thousands of chamber dumps that'll tell you the same thing?

CAPCOM Okay they said the chamber data is what got them looking at the possibility of doing this.

SC Okay Hank, I'll tell you what we'll do. We'll give you mark when we start and a mark when we stop.

CAPCOM Thank you.

SC Furge line heater isn't on, Houston.

CAPCOM Roger, copy.

CAPCOM 16, Houston. When you get ready to dump the waste water we'd like to dump to 49 per cent. That'll leave us enough for the Skylab contamination.

SC Okay dump to 49 per cent.

CAPCOM 16, Houston. We can go ahead and start cleaning up, but first we've got to load the VERB 49 with a current ROLL attitude and PRO going in attitude and then spot the spinup. For the spinup we'd like to use DELTA 2 in addition to the jets you now have to figure it so we can get a couple spinup and then turn DELTA 2 back off.

SC Okay I add DELTA 2 for the start and then turn it off.

CAPCOM That's affirmative.

PAO This is Apollo Control Houston at 264 hours 31 minutes ground elapsed time. Apollo 16 now 119 365 nautical miles away from the earth. Our velocity display now shows speed 5190 feet per second. Continuing to monitor this is Apollo Control Houston.

CAPCOM Ken, I guess you've figured out the reason we got caught there is we can't load the NOUN 79 and option too.

SC Yea just figured that out Hank. Is what I did there to fix it okay?

CAPCOM Okay you restarted after going to self-command, is that right?

SC Yea I restarted it then -- then didn't mean to stop it. Just kind of kept it going. Is that attitude looking all right or -- I don't have any way of reading out where the deadband is centered now. Would you like for me to just stop and start all over again?

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CAPCOM Okay we'll take a look at it. Okay the
centers only about a half degree of from where we wanted it.
So that's good.

SC Okay thank you Hank.

END OF TAPE

CAPCOM 16, Houston. We showed you 55 percent
on the waste tank, I'll give you call at 50.
SC We're watching it, Henry.
CAPCOM Okay.
SC It ain't good enough for past experiences,
is that what you're saying?
CAPCOM I'm not saying that at all, John,
just thought I would help if I could.
SC Okay.
SC Here you are, Hank. (garble).
SC Flight 49 done.
CAPCOM Roger. We show about 50, now.
CAPCOM Mark 50 percent.
SC Hey, she's shut down.
SC Hank, we're going to start and we're
going to give you something in a little bag first and I'll
give mark when we start it and we stop it and when I see
particles, I'll start to slow down and then we'll go empty
it in a bigger bag.
CAPCOM Roger, copy.
SC Okay, standby. Mark. It's started.
SC Okay, the bags are empty and I don't
see any out the side, yet.
SC It's started out the side, now.
SC And we're leaving the bag on purge.
CAPCOM Roger.
SC Okay, and particles are starting to
slow down but they spunk every now and then, and, man, there's
a big blast.
CAPCOM Ken, do you have an estimate of the
quantity in the little bags?
SC No, there's no way you can tell. You
are suppose to give us that.
SC That's what you're doing. You're suppose
to tell him that.
SC It's whatever 5 psi does through a
20 000 hole that is modified by ice.
CAPCOM Roger.
SC Okay, we've got the bag off. We're
getting ready to start another and most of the particles
have stopped.
SC Okay, we're running another bag.
SC Okay, that bag is empty.
CAPCOM Roger.
SC There's another bag started.
CAPCOM Roger.
SC That one is empty. Mark.

SC Okay, we're starting on our big bag.
CAPCOM Roger.
SC And it's dumping now.
SC Now, it looks like our big bag is
empty somewhere in here.
CAPCOM Roger, copy, Ken.
SC You know, Houston, we think one of
the problems you're going to have with this kind of a
measuring thing is how clogged up your filters are. We
don't think it's dumping as much right now as it was when
it started because we think the filters get clogged.

END OF TAPE

CAPCOM That's a good point, John. We also say that if we're going to do sequential dumping we're going to have to wait between the dumps, you know, to allow the nossal and the temperature to stabilize.

SC That's affirm.

SC We're going to turn the dump valve off and change filters.

CAPCOM Roger..

SC Going back to dump. Okay, we started on another bag.

PAO This is Apollo control, Houston at 265 hours and 5 minutes ground elapsed time with these timed waste water dumps the ground is trying to calibrate in the - calibrate difference in temperature on the urine dump nozzle with the volume of fluid dumped. This conceivably could aid in the procedures in acquiring medical data for Apollo 17. It is questionable at this point if the data will correlate. We're at 265 hours 5 minutes ground elapsed time. We show Apollo 17 at a distance of 117 608 nautical miles away from the earth and traveling at a speed of 5242 feet per second. This is Apollo control, Houston.

SC Okay, Houston we've got a iasess light and 37777.

CAPCOM Roger, stand by.

SC Okay the eight ball didn't move. This is CDs fail light is what it is.

CAPCOM Okay, just stand by. We're looking at it.

SC Okay, NOUN 20's all look pretty good. Yeah and NOUN 20 locks okay. Okay, no switches were being touched at the time.

CAPCOM Okay, John, we saw the same thing you did. If everything looks good we're talking it over now.

SC Need a program alarm reset.

CAPCOM Roger.

SC See the imball transit, huh?

CAPCOM Apollo 16, Houston. We'd like for you to go through mal procedures G&N number 6 on page 28.

SC Okay, stand by.

SC Okay, Hank when we go into number 6 procedure we come down in the logical answer out of block 2 is that the - you can reset the program lights and the ISS light goes off all on its own. It's only on for a very short period of time. And that says that the transet condition it stops. I guess we could take a look at - going down through the note path and try block 6, but I'd like to have some concurrence on that before we do it.

CAPCOM We concur - like you to go to block 6.

SC DUS bad comm there, I understand you want us to go to block 6.

CAPCOM That is affirmative.

SC Okay.

SC Okay before we start on that we decided to take a look at 1620 and it seems to be counting in all three axis and they agree with whats on the FDAI. We're going to start into block 40 now. And going on a block is talking, breathing at the same time.

CAPCOM Roger, Ken before you do this would you check yaw real carefully. We're showing about a degree difference between the ISS at and the ACDU.

SC Say again, Hank you were blocked out right in the middle.

CAPCOM Roger, could you check the yaw axis real closely we're showing about a degree difference down here. The other two axis look pretty good.

SC I repeat the FDAI and the NOUN 20s look like their in as close agreement as I can read. You can't tell a degree on the FDAI down here anyway.

CAPCOM Roger.

SC There's that much conversion in the instrumentation, you know that. Okay, can we proceed?

CAPCOM Proceed.

END OF TAPE

SC Okay, we did and it's counting again and it's going back to the same numbers - it just blanked again, let's see here, maybe I was premature. That's where it zeroed. It's still showing about the same numbers, Hank, the biggest change was in - no they're all ball park, within readability, from one reading to the other.

CAPCOM Roger.

SC Okay, so out of that, I come up with a yes answer and I'm going - looking at block 12, I guess in order to do this block 12, I have to be in CMC control, is that not correct?

CAPCOM Stand by. SCS should be okay, Ken.

SC Okay, I have no displacement; I did a VERB 43 enter and I loaded R 1, 2, and 3 and I got no needle displacement is another enter required or something?

CAPCOM Stand by.

CAPCOM Ken, we'd like you to repeat the procedure, starting with the VERB 43 and do it very slowly so we can watch it down here.

SC Okay, there's VERB 43, enter, plus 00250, enter plus 00333, enter plus 00333, enter and the needle's pulsed out and right back to zero.

CAPCOM Roger, copy, the needle has been jiggled, but it went back to zero.

SC That's correct.

CAPCOM 16, Houston, stand by a little bit, we'll digest this a little while.

PAO This is Apollo Control, Houston, at 265 hours, 29 minutes ground elapsed time. What we've been listening, to Ken Mattingly troubleshooting with the ground with the guidance and navigation program alarm came on onboard as this was the alarm code 03777 causing the - a warning to the inertial subsystem. He has been going through some malfunction procedures now it's - it's being assessed on the ground and we will stand by and continue to monitor as conversations develop. We presently show Apollo 16 at a distance of 116 365 nautical miles away from the Earth; velocity now reads 5 280 feet per second.

CAPCOM Apollo 16, Houston, the computer looks good to us and we're checking now to make sure that there's nothing left out in our procedures.

SC Okay, would you like for me to try them in the CMC control and I'll go to excell command so we won't get any attitudes?

CAPCOM Okay, Ken, give it a go.

SC Same thing, Hank, as soon as I hit enter, they pulse out and it looks like they go to where they belong and then as soon as it comes back it just goes out and comes right back.

CAPCOM Roger, copy.

SC Hank, looks like one other thing that would

SC check the D to A's would be - how about if I load a - just a NOUN 22 of all zeros, and then call up a VERB 62?

CAPCOM Ken, we'd like to have you just stand by, just a minute, here, and while we smoke this over.

SC Okay.

PAO This is Apollo Control, Houston at 265 hours 35 minutes ground elapsed time. Ken Mattingly aboard Apollo 16 continuing to troubleshoot with Mission Control center. His guidance and navigation system following a G&N program alarm this alarm goes to 03777, decoupling data unit failed, caused the inertial subsystem warning. At present, Mattingly is - is going through a malfunction procedure which involves punching up a variety of VERBS and NOUNS into his onboard computer. We have every reason to believe the onboard computer is working properly it is a phenomena that has developed and the control center, we're proceeding with deliberate speed to try to develop a better understanding of the cause for the program alarm. We're at 265 hours, 36 minutes and this is Apollo Control, Houston.

END OF TAPE

CAPCOM Apollo 16, Houston.
SC Go ahead.
CAPCOM Roger, what we'd like to do, Ken, is call up VERB 48 and the NOUN 46 set the first digit, digit A to 0 to kill the dapt do a verb 46 enter and then we want to go back to block 12 and start with a VERB 43. The boys in the backroom here think that the procedure won't work if the DAP is running even though we in SCS.
SC Okay, I have done this in the simulator and it did work there, but we'll try this. Okay you want to set the - you to kill the DAP as number 1 step.
CAPCOM That's affirmative.
SC Okay, then you want to go back and go through step 12.
CAPCOM That's affirmative, Ken.
SC Okay, that's in work. Okay, I have to do a VERB 46 on this now that was one of the no no's we had the other night. Is that okay?
CAPCOM That's okay now. That was just to protect EMP.
SC Okay, just turn the EMP.
PAO This is Apollo control, Houston 256 hours 44 minutes ground elapsed time. The DAP as the digital auto pilot which provides the interface between the brains of the system the computer and the thruster.
CAPCOM Roger, somebody just got the same results over in the CMS, I understand.
SC Okay, very good.
PAO The next procedure will turn the digital auto pilot back on.
CAPCOM Ken, we'd like for you to activate the DAP again and verb 48 and one in digit A and then a verb 46.
SC Hank, we like to - I'd like to run a P52 here to see what kind of torquing angles we get. That would tell us whether or not we really had any kind of a hangup in the A to D section. As short as it was we couldn't have gotten very far off in attitude.
CAPCOM Roger, we don't think it moved.
SC Say again. We were in PPC at the time so there was bound to be some rates going at the time.
CAPCOM 16, Houston SIM bay going to get too cold if we don't change attitudes. We'd like for you to roll to 280 degrees and then do the P52.
PAO The P52 is a computer program which aligns the platform.
PAO This is Apollo control, Houston. We now show Apollo 16 at 115 423 nautical miles away from the earth. We're at 265 hours 48 minutes ground elapsed time.

SC Houston, we just wanted you to know that the heart rates that you're seeing or not seeing are due to the exercise period and not the ISS light. Although, that could be a factor.

CAPCOM There hard to - The surgeon, I think had come to the conclusion you must be exercising.

PAO This is Apollo control, Houston at 265 hours 51 minutes ground elapsed time. That was John Young suspecting that some of the people on the ground may have forgotten what the flight plan said and the crew was in fact their exercise period. We now show Apollo 16 at 115 248 nautical miles away from the earth; velocity now reads 5 318 feet per second.

END OF TAPE

CAPCOM John, the surgeon says your heart rate hit a peak of 114 during the exercise period.

SC I've timed it myself; I only got up to 100. Better check his gear.

CAPCOM Roger. Ken, our PITCH has got off a little bit. We need about a 120 degrees in PITCH also.

SC Is that for thermal regions angle?

CAPCOM That's affirmative. Ken, you want to keep out on your ROLL.

SC How about telling me what attitude you'd precisely would like.

CAPCOM 280 120 and 040.

SC Okay. I can do that.

PAO This is Apollo Control Houston. At 265 hours 59 minutes ground elapsed time. Apollo 16 is now proceeding to an attitude to shine sunlight into the SIM bay. The next step will be to go to program 52 to aline the platform and check the inertial measuring unit. We now show Apollo 16 at an altitude of 114 857 nautical miles. Velocity now reads 5326 feet per second. This is Apollo Control Houston. Ken Mattingly has moved the Apollo 16 into program 52. This the platform alinement program. We're at 266 hours 1 minute ground elapsed time.

SC Okay Houston there are the angles. It does look like that metal gimbal is -- might be a little large, but it's -- it was late last night when we had the last alinement so that may be -- that may be nominal.

CAPCOM Roger we agree it has been quite a few hours since the last P52. Clear the torque, Ken. Ken, the SIM bay's warmed up and it looks like we'd give the computer somewhere a clean bill of health. And we're suspecting we've might of had a change or something in the CDU's so Jetsu would like to maneuver back to about the attitude where we had this thing and sweep out plus a minus 5 degrees and each acts as one at a time and see if we can get another glitch. Now we're trying to search those low order bits because we think that's where the problem occurred. The attitude is 182.5, 130.7, 039.7 and we'd like you to stay in SCS.

SC Okay tell me why you want to stay in SCS please.

CAPCOM Just to be conservative, Ken.

PAO The SCS is the Stabilization Control System. The backup system which they'll use to maneuver Apollo 16 to the attitudes where we saw the program alarm earlier. At the present time software looks good and this is a procedure in an effort to check out the hardware. We show Apollo 16 at an altitude of 114 237 nautical miles velocity now reads 5345 feet per second.

END OF TAPE

PAO This is Apollo Control Houston. 266 hours 19 minutes ground elapsed time. Apollo 16 now maneuvering to the spacecraft attitudes where we had earlier seen the program alarm. The intent here is to try and duplicate the problem. We'll standby and continue to monitor.

CAPCOM And Ken when you get to the attitude we'd like to sweep this 5 degree band there with a very low rate say maybe using a minimum impulse.

SC You guys wouldn't want to consider the very conservative approach of just avoiding this 5 degree area on the 8 BALL would you?

CAPCOM Well we don't want to do that yet.

SC Okay. You want a sweep of one axis at a time? Is that what you're talking about Hank? Say like 125 to 135 in the -- in the PITCH.

CAPCOM That's affirmative.

SC I see. Okay Hank, do you have any preferred axis first? We'll take your offers.

CAPCOM Okay.

SC Okay Hank, is 5 degrees sufficient to cover all your bits?

CAPCOM They're checking. That'll do it Ken. 5 degrees will cover the low order bit.

SC Okay going back the other way with ya'al.

PAO This is Apollo Control Houston at 266 hours 28 minutes ground elapsed time. That's Ken Mattingly maneuvering the Apollo 16 spacecraft in varying attitudes within a 5 degree range in PITCH and ROLL and YAW, in an effort to duplicate the program alarm that we had seen earlier. We now show Apollo 16 at an altitude of 113 314 nautical miles from earth. Velocity now reads 5373 feet per second.

CAPCOM Ken we'd like to do ROLL next for the next axis.

SC Oh very well.

PAO Apollo Control Houston at 266 hours 43 minutes ground elapsed time. Ken Mattingly continuing to slowly maneuver the Apollo 16 spacecraft in attitudes. He has completed a checkout in ROLL and YAW and is now in the process of completing the maneuvering ranges in PITCH attitude. We'll standby and continue to monitor. We now show Apollo 16 with an altitude of 112 511 nautical miles and a velocity of 5399 feet per second.

SC Okay Hank what do I do with the end of this little sweep?

CAPCOM Okay we didn't get it did we?

SC No sir. Sure didn't.

CAPCOM Standby a second Ken.

END OF TAPE

CAPCOM Standby a second, Ken.

CAPCOM Okay, Ken. Here's the plan. The GSC gives a hardware clear bill of health. So, they're going to smoke over the data now and look at why we got that little (garble) in there. In the meantime, it looks like we're safe to proceed with the flight plan. We'd like to pick it up at 267 going to this CO-X 1 attitude and since we're real fat on RCS here, we'd like to do the maneuvers between these different attitudes today where we're getting datas in different attitude at a faster rate half degree per second, and if that's all right with you, then, we'll get the X-ray on now which is called for in the flight plan and then start maneuver into the XO-X attitude and I guess we can use CMC for that.

SC Okay, I'll concur with you for CMC and do you have any bill for midcourse (garble)?

CAPCOM I'll get answer on that, Ken.

CAPCOM Right now, it's looking like about 3 feet per second, Ken.

SC Okay. I think we can cover that.

PAO This is Apollo Control, Houston, at 266 hours 51 minutes ground elapsed time. We've completed our troubleshooting with Apollo 16 trying to sort out the earlier program alarm which occurred. The assessment here at this time is at -- it was transcit glitch. We will review the data, but presently press on with the flight plan moving forward by some 10 minutes, the X-ray pointing experiment. We now show Apollo 16 at 112 135 nautical miles away from the earth and traveling at a speed of 5411 feet per second.

CAPCOM Apollo 16, OMNI, Charlie.

CAPCOM Apollo 16, command reset, and OMNI CHARLIE.

SC Houston, 16. Are you reading us?

CAPCOM Say that again, 16?

SC I just -- got you back on the OMNI -- correction high gain, Hank. Okay, now how do you read?

CAPCOM Okay, read you 5 by 5 and we got high bid rate and locked up, it looks like

END OF TAPE

CAPCOM Ken, if you've got a minute, I've got a little procedure here we want to try. Another little trouble shoot, if your free.

SC Rog, just a minute. We'll get him back on comm.

SC Hello, Henry.

CAPCOM Hello, there. We've got something we'd like to try here, and it's purpose is to determine whether the time delay on the CDU failed detection circuitry is so short that - apparently normal CDU movements can trigger the alarm. And a normal time delay is 2 to 10 seconds. And we've got a procedure here we'd like for you to run and time it, time this thing, and see if that might be our culprit.

SC Okay, read it to me.

CAPCOM Okay. We'd like for you to go the SCS control, then low, and uncage B mags so we can hold this attitude pretty close. Then we'll do a VERB 25, NOUN 7 ENTER, 12 ENTER, 20 ENTER, 1 ENTER, and when you ENTER on the 1, we want you to start the stop-watch, and as accurately as possible, get the time from the ENTER until you get to ISS warning light. And after you get -

SC Okay. So this channel 12 is going to, is setting the bit that is the ISS warning bit that comes from the hardware, and the computer is the thing that does the timing. Is that correct.

CAPCOM What that's doing is zeroing the CDU's. And that guarantees you a fail. Okay, and as soon as you get the accurate time on that, we'll do a VERB 40 ENTER, and wait 10 seconds for the CDU's to recover.

SC Okay, I'll do that and then I'll call the steps out as I go through it.

CAPCOM Roger, and be advised that the CMC DAP is inoperative between the time you set the bit and the time you do the VERB 40.

SC Also for 10 seconds there after.

CAPCOM Roger.

SC Okay, we're in SCS. Dead band the rates slow and when the cycles on we've got the B mags uncaged. Are you watching this to, John.

CAPCOM Okay, we're looking down here.

SC All set. There's VERB 25, NOUN 7 ENTER, 12 ENTER, 20 ENTER, 1 - NOUN I have ENTER reset. Okay. Here we go. 5, 4, 3, 2, ENTER. I've got 5 seconds.

CAPCOM Roger, that's normal indication. That eliminates that as a possible source so you can go ahead and do your VERB 40 recover and go back to CMC control

SC Okay, back in CMC.

CAPCOM And Ken, we're ready to get the Alpha particle X-ray cover open.

APOLLO 16 MISSION COMMENTARY 4/26/72 CST 02:12 GET 267:04 871/2

SC It was already open, Hank.

CAPCOM Roger, copy.

SC (garble) wants us to verify that.

PAO This is Apollo Control Houston, at 267 hours
10 minutes ground elapsed time. The purpose of that excersise
was to determine whether or not the CDU failed detection circuitry
was so short that fairly normal CDU movements might trigger the alarm.
This eliminated that as a possible.

SC Third compartment.

SC 2.7.

CAPCOM Roger, 2.7.

SC Okay, I make it 265.

CAPCOM Rog.

END OF TAPE

CAPCOM Apollo 16, Houston. We need the X-ray off for 2 seconds and then back on. The purpose of that, Ken, is to set the logic looks like it didn't set properly.

SC Okay, you have it.

PAO This is Apollo control, Houston at 267 hours 25 minutes ground elapsed time. Apollo 16 now 110 378 nautical miles away from the earth. Veclocity now reads 5 468 feet per second.

CAPCOM Apollo 16, Houston. Since we just did a P52 a few minutes back we'll scrub the one that's scheduled at 268 hours prior to the TV.

SC Okay, Henry thank you. We're setting the TV up now.

CAPCOM Roger.

PAO Apollo control, Houston at 267 hours 38 minutes ground elapsed time. That was lunar module pilot Charles Duke aboard the spacecraft responding to our capsule communicator Henry Hartsfield. The P52 referred to is a platform alignment. The platform had been aligned recently as troubleshooting was taking place with the guidance and navigation system. We now show Apollo 16 at a distance of 109 668 nautical miles a velocity of 5 490 feet per second.

SC Yeah, it'll be satisfactory for the TV, also right?

CAPCOM Affirmative.

SC Okay, fine.

SC Houston, 16.

CAPCOM Go ahead.

SC Hank, can we go VOX TV to check - get the camera set and focused?

CAPCOM We need about 12 more minutes.

SC Okay, we'll wait. We'll hold off, we got plenty of time.

SC Houston, 16.

CAPCOM Go ahead.

SC What's our velocity - inertial velocity and distance out right now.

CAPCOM Okay, your 5516 feet per second and 108 880.

SC Thank you, Henry. That was the nicest thing you could say. I'll split it with you.

CAPCOM 16, Houston, you can check out the T.V. now.

SC Okay, thank you.

PAO This is Apollo Control, Houston, at 267 hours 57 minutes ground elapsed time. Capcom, Henry Hartsfield passing the go ahead for the television check out in preparation for the news conference.

END OF TAPE

SC Okay, Houston, we got the gear all checked out ready to go whenever you are.

CAPCOM Roger. Roger, we've got just under eight minutes to go.

SC Hey, Hank, do you have a list of questions -- are you going to be reading the questions up?

CAPCOM That's affirmative.

SC Okay, thank you.

PAO This is Apollo Control Houston at 268 hours 6 minutes ground elapsed time. We now show Apollo 16 at an altitude of 108 196 nautical miles away from the Earth. And a velocity of 5539 feet per second, and we're standing by for the start of the press conference.

CAPCOM Apollo 16, Houston, we're about ready to go here, do you want to try to bring up the TV?

SC Okay, it's in work.

CAPCOM Okay, we've got a picture now.

SC Super! How does it look?

CAPCOM Looks pretty good.

SC How does everything look to you?

CAPCOM Other than the fact you're looking pretty wooly now, it's not bad.

SC Keeps you warn.

CAPCOM Apollo 16, there's questions in this press conference that have been prepared by newsmen covering the flight here at the Manned Spacecraft Center. I'm going to read them to you exactly as worded by newsmen, and then a priority specified by them. Question number 1 for John Young. "A couple of times you were on hot mike and didn't know it, but how could a nice Florida boy like you say what you did about citrus fruit?"

YOUNG That's a very good question! Wait'll you drink it day and night for two weeks, and let me know what you think. -- And for lunch too.

CAPCOM Question number 2.

YOUNG I have an orange grove down in Florida too, so I do like citrus, but citrus drinks are something else.

CAPCOM Question 2. "When the CSM circulation burn could not be performed on schedule, did you think you wouldn't be able to land on the Moon?"

SC I thought we all had serious doubts about whether we're going to be able to do it or not.

CAPCOM Question number 3 in three parts. 1) "Were you suprised at the rocks and other formations at the Cayley site?"

SC Uh, I think we were. The original impression had been mostly volcanics to look for, and I don't think we found the highest percentage of volcanics as we had originally anticipated. So the rocks that we found were unique, that we had never seen before in any of the lunar samples, we feel, and so

SC it was a surprise.

CAPCOM 2) "Do you think your geological training properly prepared you to describe them?"

SC I think so under the circumstances. You see, most of the rocks were dust covered by the two impacts, North Ray and South Ray. It had just thrown a big blanket of dust out across there, and we saw very few rocks that were clean until we cut into them. And you don't want to take too much time to stop and whack off a piece of rock because it's pretty hard to do in a pressure suit, so we're just describing them more by shape and softness and friability and things like that. And that really doesn't take a lot of training, but I think we've had adequate training to do this kind of job.

CAPCOM 3) "Did you see anything specifically volcanic?"

END OF TAPE

SC As far as craters go, Hank, we think we saw 2, that had the shape we called indogeanetic that had the shape of very subdued old Cinder Cone or something of that nature. They -- in other words they were look more like, well sink holes really with the surrounding topography they had not rim on them and to us it looked like it might have been a source for some -- volcanic activity way back.

CAPCOM Question 4, several times at North Ray you mentioned don't get too close to the edge. Did you think that if you had fallen in you wouldn't have been able to get out?

SC That's affirmative. If we had fallen in we would not have been able to get out, that's correct.

CAPCOM Question 5, the heat flow experiment you broke was successfully fixed in simulation although it was complicated and took a great deal of time. Do you think you should have tried to fix it or do what you did?

SC I don't think we're qualified to make that decision. It was made by people on the ground are far more qualified to do that sort of thing than we are. If we had been told to do that we would have certainly done it.

CAPCOM Would you like to have been informed of the successful simulation and the trade off factors involved?

SC I still don't think that that's our decision making process up there on the surface.

CAPCOM Question 6, you had a lot of equipment trouble during this mission is there a common thread running through all these problems for which you could suggest an explanation?

SC I think space flight's kind of complicated. You got a lot of sophisticated equipment here that your trying to get to all work at one time, I think that's what we built a redundancy in for and it's seems to be paying off quite well.

SC Yeah, I don't think there's any relation between any of these failures one to another, I don't think there's any common thread, I agree with Ken it's a very complicated gear, it has to run for long periods of time and you got to expect sometimes that it won't run and you got to know how to fix it and that's why they send us on these trips.

CAPCOM Question 7, for Ken, your observations of the landing site. Did you see the lunar module or the Rover and did you see any deferences between Cayley and Descartes?

SC Okay, that's two distinct questions First thing did I see it? We never pointed the sextant

SC at the landing site, according to the flight plan because of the alterations we had. And there were two occasions once when I thought I caught a glim of light which I could not recognize as the LM, but which came from the location where I think the LM probably was sitting, that was very close to the position on my map that you folks read up to me. And once as the Rover was starting up on Stone Mountain, I just happened to be looking as they went by and I think you were on the shift, Hank, and told me that they were hitting Stone Mountain, and I looked over there and about that time I got another little flash of light, which is about all with the 10 power optics we have that I think you could expect to see. At no time could you see something you could identify.

CAPCOM Second part of that question was did you see any differences between Cayley and Descartes?

SC Yes I think there's a distinctly different morphology involved in these two units. Our pre-flight training is a little different in impression than what I think I saw and again we have 10 power resolution, I think the real answer of what this material is is going to lay in analyzing the data post-flight. We have some good ilm records and I think the -- when you put that together with the rocks we picked up we'll have a pretty powerful story that'll explain a lot of things we don't know now. But I think that there are sections of material we call Descartes particularly the material that makes up Stone and Smoky, and that stuff runs all the way south down to the old Descartes crater for which the region is named and that does look texturely entirely different from the Cayley formation.

END OF TAPE

CAPCOM Question number 8, again for Ken, what were you impressions of the back side of the Moon and were there any surprises?

SC Well the impression of the back side is something I tried to collect from the time we got there till the time we left. And I'm still mulling that over in my mind got a lot of transcripts we're going to have to read, before I can psyche it all out, but in general the impression have is that the material on the back side when you look at it on as small a detail as I can look, looks to me like it's very much like the material we find on the front side surrounding most of the big craters. The thing that looks different is that the back side is devoid of these large basin, we don't have the large maria, there's very little Maria, in fact on the back side the only Mare we saw was really post TEI when we could look back and see a big area. But our ground track didn't pass over any Mare in the daylight, so it took a while to psyche that out, but I think that was a major difference was the absence of these large basins and on the back side did we see surprises? Well we went up looking for with a suspicion that we might find material similiar to the Descartes formation, located on several areas on the backside and indeed I think we did. I think we saw an awful lot, I think we saw a lot that looks exactly like the Cayley. I think the things that I saw that were probably the most surprising thing was on the side of a crater called Guyot which is just to the north of and a little west of King crater which is right about the eastern limb of the Moon when you get it from the Earth. We saw a big hole, I'll it crater in the side of this -- of the wall of this crater and it appeared that there was materials oozing out and on our last couple of REVS we past almost directly overhead and it looked like it was filled with a pool of material and this material had run down the side. And that's a formation typical of things you see like, in Hawaii, something I have not seen anywhere else on the Moon, nor have I seen a picture of it.

CAPCOM Question number 9, for John and Charlie, at the tag end of EVA 3, you appeared to be having a high jump competition, who won and how high do you think you jumped?

SC No we weren't having a competition we were just showing you some of the things you can do, with a 360 pound mass that only weighs 60 pounds even, slowed down if you will by the pressure suit. And I don't think anybody won we were just demonstrateing what you can do with the suit.

CAPCOM Question 10 --

SC I don't have any idea how high we can jumped, you have to look at the T.V. maybe a foot or 2 feet. It was too high for me.

CAPCOM Question 10 could you explain the circumstances surrounding the failure of the lunar module ascent stage to the orbit?

SC I think that has to be worked out when we look at all the data on the ground and discuss it with the flight controllers. At the present time I have no idea.

SC I don't either.

CAPCOM Question 11, to what extent --

SC Could you verify that you still have our picture?

SC We've lost our monitor and we just like to make sure there's nothing wrong with the camera.

CAPCOM We have a good picture. Question 11, to what extent did fatigue effect your performance? For example do you feel that you would have been capable of a full 7 hour EVA 3, lift off and LM jettison all in the same day?

SC I think that'd been pushing it a little.

CAPCOM Question 12, for each of you--

SC We could probably have done it but I think that'd really been pushing it.

CAPCOM Question 12 for each of you, what do you hope to tell your grandchildren as your most memorable moment of your trip to the Moon?

SC Well I'll start with that one, Hank, I have two impressions. The first is the dazzling beauty of Descartes, the surface it

END OF TAPE

SC First, is the dazzling beauty of Descartes, the surface. It was just one of the most orange foreign sites I've ever seen. And secondly, on the EVA, when you look away from the Earth for the Moon, it's just the utter blackness of space. It really is black out there! Time number 53 you said that. Now I guess I'm next and I knew someone would ask that question, and I've been asking that question too. And I don't think I can put an impression, there's so many that we've crammed in the last 12 days, and seems like each one comes on top of the other one, and the immediate responses you come up with is that's the most fantastic thing I've ever seen! In a lot of respects it really is. There have been so many events and so many sites that in my case I'm going to have to sit and think about this one for a long time, before I can ever pick out one, and I'm not sure I'll ever be able to say that there was A unique thing, or A most memorable event. The whole thing has been just one series of very impressive and, I hate to use the word, but I don't know anything else to say, except to say it's fantastic. I think Ken's got the answer. I think we've seen as much in 10 days as most people see in 10 life times! And we certainly have enjoyed it.

CAPCOM Question 13. "From an astronaut's point of view, would you discuss the possible operational difficulties besides language, to be overcome in the proposed joint US-USSR manned space flight? And would you have any projections to make?"

SC From an astronaut's point of view, I would not feel qualified to discuss it, other than to say that if language is a problem, I'll be glad to learn Russian. I think Charlie and Ken feel the same way.

CAPCOM Question 14. "Did the potassium in your diet affect the taste of the food, and did it cause any other problems?"

SC That's a very good question, and I'm not sure we're qualified to say. We'll have to get back and talk to everybody. I don't think it -- I didn't notice it being in there as far as taste was concerned. And I don't think anybody else did. Yeah, this is one of those things where you have to wait and take a look at our post-flight medicals and see what they come up with as our body potassium level. That's really the part they're trying to work on, and I'm afraid the guys on the ground have a lot more data than we have on our physical condition. Other than the fact that we know that we feel good. Yeah, I think we've been very fortunate to do as much of the mission as we have, considering how much we got slowed there, and I don't know whether potassium had anything to do with it or not, but if it did, I'm sure grateful that we were taking it.

CAPCOM Question 15. "For John. What did you mean when you said, 'Morale went up a couple of hundred percent after the successful TEI.' Was it low?"

SC Yes. No, not particularly. It just -- it would sure be low if you didn't get off the TEI burn, I can tell you that.

CAPCOM Question 16. "For each of you, based on your experience, do you have any recommendations right now for the crew of Apollo 17?"

SC Yeah, I recommend they enjoy it as much as we did. I'm sure they will. 'Cause I tell ya, we really have had a lot of sights to see, I'll admit that a lot of cases we worked hard and I suppose the people on the ground were able to tell that. But we got all support in the world from the MCC Houston, I could -- I mean I could tell from every decision that came up from the ground that there had been a lot of work put into it, and all around the country that there were a lot of wheels turning and people working late hours, and solving these problems. And I'm just really happy that Ken, Charlie, and myself got to do this, and I think --

END OF TAPE

YOUNG And there are a lot of wheels turning, and people working late hours, solving these problems, I'm just really happy that Ken, Charlie and myself got to do this. I think it's a wonderful experience.

CAPCOM That was the last question, John. We thank you very much and thank you for the kind comment.

YOUNG Well, let me just say one thing, Hank, and that is - Mr Descartes said it, he said, there's nothing so far removed from us as to be beyond our reach or so hidden that we cannot discover it. And you know Descartes was a french mathematician and philosopher, for whom the region was named. And I guess, really, the story of our Mission so far, we've been out testing this theory. My personal assessment of where we are now, as soon as we get the rocks back in the LRL, we'll be making headway toward proving he was right.

CAPCOM Good show, John.

MATTINGLY Okay, Hank, as the LEB sinks slowly in the distance, we'll say goodbye.

SC Houston, 16.

CAPCOM Go ahead.

SC Okay, Hank. You want S-band off and back to SCI?

CAPCOM Affirmative.

SC Okay, you got it.

CAPCOM Nice job there guys.

SC Thank you sir.

PAO This is Apollo Control Houston 268 hours and 33 minutes ground elapsed time. Apollo 16, now 106 716 nautical miles away from the earth. Velocity now reads 5587 feet per second.

CAPCOM 16, if you'll give us ACCEPT, we'll give you another state vector.

SC Roger.

END OF TAPE

CAPCOM Apollo 16, looks like we're stratification in the H2 tanks, would you take the H2 fans on for a minute, and then back off again?

CAPCOM The computer's yours, 16.

SC Okay, Hank, and we've got the fans on.

CAPCOM Okay, thank you Charlie.

SC Okay, your fans are off.

CAPCOM Okay, the tanks look good now.

CAPCOM Apollo 16, Houston.

SC Go ahead.

CAPCOM Roger, I got sort of an outline of our plans here for the rest of the day. You might want to jot these down on your scratch pad Ken, then you can operate on the flight plan.

SC Okay, standby.

SC Okay, Hank, we don't you go ahead?

CAPCOM Okay, in absence of any thermal problems, this sco X 1 we're in now, is going to run until 270:30.

SC Understand. 270:30.

CAPCOM Roger, and at the termina -- at 270:30 we want you to immediately maneuver to the SKYLAB attitude, Skylab contamination and as soon as you get into attitude do the photo-sequence B, SKYLAB contamination photosequence B, and --

END OF TAPE

CAPCOM -- and soon as you get in attitude, do the photo sequence B -- SKYLAB contamination photo sequence B, and SKYLAB dump sequence. And do those as quickly as possible. And in the dump sequence, number 3, it now reads do it 30 minutes after sequence 1. Make that 15 minutes after sequence 1.

SC Okay, we'll stay with sco X 1 until 270:30, then we'll go to SKYLAB photo sequence B, and we'll press right through that and the dump sequences. And we'll do dump sequence number 3 at 15 minutes instead of 30 minutes, and we're ready to press on.

CAPCOM Okay, then after that, maneuver immediately to attitude of noun 20 per roll 128 042 and we want to do the ecliptic OX PTC with a minus 3/10 rate and a 2 degree deadband. And that's what we started at 264 hours when we got the glitch.

SC Okay, you want the completion of the dump sequences, you want to go to noun 20 roll 128 pitch 042 in yaw which will start the ecliptic OX PTC mode. We use 2 degree deadband minus 3/10 of a degree per second rates.

CAPCOM Roger. And, now it doesn't say how long --

SC -- use the thruster configuration I have now.

CAPCOM That's affirmative. Use the same thruster configuration we had before, and when we finish that sequence -- and I'll get you a time on that a little later how long we do that -- we're going to go to the ecliptic OX PTC for the (garble) CYG X 1 photos. And that'll be at 273:15 we want to do that.

SC Okay, Hank, I didn't follow that. I thought we were in the ecliptic OX PTC in this earlier maneuver. So say again what happens at 273:15.

CAPCOM At 273:15 -- excuse me, I may have -- I read it to you wrong Ken. We want to go to the CYG X 1 point, per the flight plan.

SC Okay, at 273:15 you'd like to CYG X 1 per the flight plan.

CAPCOM Roger. And we want to continue with a 5/10 degree per second rates, at least maneuvers and try to make up as much time as possible until we get back on the flight plan at 273:15. And if we have any thermal problems just to read you in on what we're thinking, we'll scrub the SKYLAB contamination first, and the ecliptic OX second, as required.

SC Okay, when you say SKYLAB contamination, you talkin' about both the dump and the sequence B, or are you referring just to sequence B?

CAPCOM It'll be the whole works if we have a thermal problem.

SC Okay.

CAPCOM And that's our plan, Ken. Is there any question on that?

SC No, I think I understand what you want to do.
CAPCOM Okay.
CAPCOM Charlie, we got a couple of very special guests
here would like to see your biomed. And they guarantee they'll
be able to understand it.
SC Boy, you got me Hank. It'll be 15 minutes
before I can get it up.
CAPCOM Rog, understand.
SC Oh, I know who you're talking about. Good.
Thank you.
CAPCOM You're a little slow at that, Charlie.
SC Yeah, it took me a while there, thank you.
Tell 'em hi.
CAPCOM Are you going to do it Charlie?
SC Say again?
CAPCOM Are you going to do it?
SC Yeah, I can get some sensors on.
CAPCOM Okay.
SC While we're waitin', in the meantime, I can
guarantee ya ol' Charlie is alive and well.
CAPCOM Roger, and you guys did a great job here on
that show.
SC Thank you, Hank. You ask pretty mean ques-
tions, I'll tell you that.
CAPCOM John, the truth is, the backup crew wrote
those questions. And I got your midcourse 7 pad and entry pad.
SC Roger, wait a second.
SC And Hank, we just completed our EMS check,
and it works like a champ!

END OF TAPE

SC And, Hank, we just completed our EMS check and it works like a champ.

CAPCOM Outstanding.

SC Okay, go ahead for midcourse 7.

CAPCOM Roger. MCC 7 RCS G&N 27 318 NOUN 33 287 22 5628 NOUN 81 minus 000 31 all zips minus 4 balls one. 102 126 040 HA as NA plus 00 217 000 31 007 000 31 sextant star 13 3127 337 foresight star NA minus 0071 minus 15617 range to GO 10459 36276 290 23 59 Sirius and Rigel. 219 166 313 4 jets plus X. Comments EMS not biased for drift. PTC REFSMMAT.

SC Okay, MCC 7 RCS G&N 27 318 hours 187 22 56 28 minus 000 3.1 all balls minus 000 .1 102 126 040 HA as NA HP and 21.7 Delta VT at 3.1 burn time 7 seconds Delta VC 3.1 sextant star 13 plus 312.7 plus 33.7 non apolune on the bore sight, latitude minus 00 7.1 longitude minus 156 .17 1045.9 plus 36276 290 2359 Sirium and Rigel as set stars. 219 166 313 4 jets plus X, EMS not biased for drift and PTC REFSMMAT.

CAPCOM Roger. Johnnie, would you reread the NOUN 33.

SC 287 22 56 28.

CAPCOM Roger. Good readback.

SC Okay, you want to give me the entry bat?

CAPCOM Okay. Midpath 000 153 000 290 06 32 267 minus 00.71 minus 156.17 069 36196 650 10459 36276 290 23 32 0027 NOUN 69 NA 0400 02 02 0016 0332 0744 sextant star 25 151 6 262 boresight NA. Lift vector up. Comments: use nonexit EMS pattern RET for 90 K is 6 plus 05, RET for the for the nains 8 plus 30 RET landing 13 plus 22, constant G entry roll right, Moon set at 290 20 26. EMS entry reverse bank at 2000 foot per second. Okay, these entry angles assume the crew has done the procedure to obtain the entry REFSMMAT. And that's at the bottom of GC checklist 4-18. And you must realine the platform to the entry REFSMMAT or you'll go into gimbal lock during PC --

END OF TAPE

CAPCOM And you must realign the platform to the entry REFSMMAT or you'll go into gimbal lock during P67.

SC Okay, say again the page that's on?

CAPCOM G 4-18.

SC And it also assumes MCC 7?

CAPCOM I'm sorry, John, somebody said something. What was your question?

SC It assumes MCC 7, right?

CAPCOM That is affirmative.

SC Okay, the midpack area, roll, zero, PITCH, 153, YAW zero, GT horizon check 290 06 32, PITCH 267, latitude minus 000 7.1 longitude minus 156.17, 6.9 max G, 36196 minus 00650 plus 10459 plus 36276 290 23 32 27 seconds D zero 4.00, decirc 202 016 332 0744 25 1516 26.2 lift vector up. Comments non exit EM S pattern. RET 90 K 6 plus 05, RET main 8 plus 30 RET landing 1322 constant G entry, roll right. Moon set 290 20 26, EMS entry reverse bank at 20 K feet per second. And this assumes the crew procedure to get the entry REFSMMAT on page G 4-18. And also assumes MCC's 7.

CAPCOM Roger, and you must have the entry REFSMMAT or you go into gimbal lock.

SC Okay, we got the picture.

SC And Hank, I'm up on biomed and no arrhythmias don't count.

CAPCOM They say everything looks fine.

PAO This is Apollo Control at 269 hours 13 minutes. We've completed a shift hand over in Mission Control and the Flight Director at the present time is Donald Puddy and our Spacecraft Communicator on this shift is Astronaut Donald Peterson. There will be a change of shift briefing. We expect that that will begin in a little less than 30 minutes at 4:45 pm Central Standard Time. This briefing will be in the News Center Briefing Room, Building 1 at the Manned Spacecraft Center. Again that time estimated at 4:45 pm. A short while ago CAPCOM Don Peterson read up to the crew the numbers that will be used in the midcourse correction 7. The final midcourse prior to entry is scheduled to occur at about 3 hours before entry tomorrow at ground elapsed time of 287 22 56, 287 hours 22 minutes 56 seconds. And that is our updated flight plan time. With entry occurring at flight plan time of 290 hours 23 minutes 22 seconds. Our preliminary numbers on events following entry are as follows: The entry interface angle as a result of this midcourse correction should be minus 6 and a half degrees, or 6 and a half degrees below locate horizontal, which is nominal. 16 seconds after entry we predict the spacecraft will enter the period of blackout for ionization, blacks out radio communication. Blackout should end after 3 minutes 32 seconds or rather 3 minutes 32 seconds after interface. Blackout would end for a total period of black

PAO out of about 3 minutes 16 seconds. 7 minutes 44 seconds after entry the 2 drogue parachutes should deploy, with the main chutes coming out at 8 minutes 30 seconds, and splashdown approximately at 13 minutes 22 seconds after entry interface. Midcourse correction 7 will be performed with the spacecraft reaction control system thrusters will require a 7 second pulse of these thrusters, and producing a total velocity change of 3.1 feet per second. And the purpose of this midcourse correction is for corridor control, to give the spacecraft the desired entry interface angle of 6 and one half degrees, minus 6 and a half degrees. At the present time Apollo 16 is 104 400 nautical miles from Earth and the spacecraft velocity is up to 5669 feet per second.

END OF TAPE

PAO This is Apollo Control. Flight Director Don Puddy has been going around the room, checking with each of his Flight Controllers on our status in this point of the mission, and reviewing the upcoming activities on the flight plan for this shift. One of the major things that the crew will be doing during this shift will be a series of operations with the command and service module and also with the cameras they're carrying, with 3 of the cameras, to determine what effects such things as water dumps and various attitudes of the spacecraft have on efforts to photograph dimlight phenomena. This is of particular interest to people doing the planning for Skylab. It will affect such things as Mission Planning and Spacecraft Systems Management during Skylab while astronomy operations are going on in an effort to gain some information on the effects as such things as water dumps on the ability to take dimlight photographs, photographs of dimlight phenomena. The crew will be operating with 3 cameras, the 16 millimeter acquisition camera, the NIKON and the Hasselblad, all using high speed film and taking photographs at various times and in various attitudes from the CSM. At one point during the Skylab Contamination Sequence they will perform a water dump and will attempt to determine what affect the resultant cloud of particles - ice crystals has on their ability to photograph dimlight phenomena, and also how long the cloud requires to disperse. This entire operation is scheduled for about 2 hours 15 minutes on the flight plan. Also, one of the activities, again tonight, will be the operation of the scientific instrument module bay equipment, particularly the Gamma Ray, the Alpha Particle and the X-ray Experiments. One of the targets in deep space will be Sco X1, this is a hot spot of X-Rays in deep space, the X-Ray Spectrometer Experiment will be pointed at this galactic source of X-rays and will be attempting again to gather information which the principal investigator will use to determine the signature of this particular Xray source.

CAPCOM 16, Houston. We'd like the gamma ray shield on now, please, and during the next few hours we'll be calling in realtime, all the gamma ray shield calls and the gain step calls.

SC Okay, Don, thank you.

SC Roger. Good afternoon, Donald.

CAPCOM How are you doing?

PAO This is Apollo Control. Our Change of Shift Press Briefing is ready to begin at this time. We'll switch to the MSC News Center Briefing Room for that.

END OF TAPE

PAO This is Apollo Control at 270 hours 5 minutes, during our change of shift briefing, we had no conversation with the crew. We'll leave the lines up live from this point on. The next major item on the flight plan has a series of operations known as Skylab contamination photos, the crew as was mentioned previously will be using the 16 millimeter data acquisition camera, the Nikon camera and the Hasselblad camera. In an exercise to determine what effect such things as water vats and various spacecraft attitudes have on the ability to photograph dim light phenomenon, this is of particular interest to Skylab, where quite a bit of astronomical type of experiments and studies will be going on.

END OF TAPE

CAPCOM 16, Houston. When you get in this maneuver to the second attitude, we'd like to go mapping camera door open and a gain step up 4 steps and then Stu's got some words for you here on the use of EMP 509 for entry.

SC Okay, stand by. Okay, you've got the mapping camera door open, and you've got the gain step up 4 steps.

CAPCOM Roger, copy.

SC Okay, we're on our way. How about giving us first a couple of philosophy words on 509, and if there's something for us to copy we'll come back and catch it later with our books.

CAPCOM Okay, Ken. I think we'll not copy anything at this time or make any changes to the entry checklist. I would just like to give you a few words on it and let you mull it over. If you have any questions, then tomorrow morning we'll make the changes. Basically, we're recommending the use of 509 during entry. And of course, the TVC relay that we've chased around will not be activated during entry. However, all the time there's been this doubt that we can say specifically, that's the relay. We think it's a high probability source, however, in lieu of today in particular. We're not sure that - we can't rule out that some other EMI might glitch that CDU. They've taken a good look at the wiring in the CDU and as it turns out, the 90 degree bit in CDU-Z is the most sensitive to being set by EMI. And this bit is wired differently than the other bit. So to preclude going into course a line, we'd like to use 509 for entry, and of course, this doesn't prevent any glitches, but it does prevent you from locking up the platform with the course a line routine. What this is - go ahead, Ken.

SC I was thinking about the things that happened today. We didn't have to do anything. It didn't lock up anything, and didn't look like even zeroing the CDUs had any effect on it.

CAPCOM We agree to that -

SC With 509, if we have a glitch, what would you anticipate would be the proper thing to see and the proper response?

CAPCOM Okay, now, as we've said before, the only thing 509 will do for you is to prevent the CMC from going into the course a line routine. If you indeed, get a glitch, you're going to have the CDU indicating a wrong attitude, this would be reflected, most probably, in your noun 20s, and you could expect the spacecraft, if you're under CMC control to try to chase off after this noun 20, and if it is the 90 degree bit, you would - the 509 would keep you from going into course a lined. So, if the spacecraft moves, you would

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CAPCOM Not lose your attitude reference, and you could do a verb 40 0 CDUs and be back in business again. That's the only thing that we have to offer on the thing is to try to prevent this course a line, if you get the 90 degree glitch. Now, if you get a glitch in ROLL - you could get a ROLL or PITCH. And under CMC control it would see this as an erroneous noun 20 and do what attitude hold is going to try -

END OF TAPE

CAPCOM -- if you get the 90 degree glitch. Now, if you get a glitch in roll -- you could get a glitch in roll or pitch, and under CMC control it would see this as an erroneous noun 20, and do whatever is appropriate. If you are in attitude hold it's going to try to chase it.

SC Okay.

CAPCOM Okay, and as I said, let's don't make any changes to the checklist. Let's message this overnight, but basically what you're going to do is continue to use SCS control for your P52s, and then we'll -- as we start into our entry program, we'll make one entry as we go into P61 and then 509 protection will be in once average G and P61 comes back up. And then as you activate the entry DAP, this is going to kill 509 because of it resets the DAP registers. So after you enter the entry DAP, you're going to have to do your verb 21 noun 46 and put your three back in R1 of noun 46. The procedures look pretty straight forward, Ken, there's -- like I say these two spots where you need to make these entries. They look real straight forward, and it's the same numbers that you've been using. And once you have put 509 back in after the activation of entry DAP, then it will be in throughout the rest of the entry.

SC Okay. Sounds like you guys have been working again.

CAPCOM Well, this is -- (laughter) you know, this is really chasing a spook bet here, but I guess we're probably getting a lot of experts on CDUs, and it looks like the 509 is the way to go. And the question you might have is, well, why didn't we do 509 during the rendezvous if that's what we're concerned about. And there I just didn't want any glitches, and I did want to keep the gimbal lock protection in. Something maybe we have discussed with you that if 509 is in and you truly go through your 90 or 270 yaw, you will most probably damage the IMU. And you hear the words you'll break it, you'll hear the words you'll render it unreliable, so forth. So as long as 509 is in, you do not have your true gimbal lock protection because the CMC will never go to course align. And I didn't feel it was worth doing that -- taking any sort of chance on the platform until we've got down to entry point, but once we're here it is sort of superfluous. If you go there you've lost your reference anyway, no matter what you've done to the platform, but you should be aware that you have lost this protection.

SC Okay, sounds real good, Stu. Thank you sir. Yeah good work Stu, thank you.

CAPCOM Okay, and if you don't have anymore questions on this, I'll get off the loop and we will have these specific changes to the entry checklist for you tomorrow.

SC Okay, don't stay up all night.

CAPCOM No sweat! Don't you either! We'll see ya.

PAO This is Apollo Control at 271 hours 6 minutes.

That was Astronaut Stuart Roosa discussing entry procedures with the crew. Roosa, in particular, has been going through the so-called EMP 509 routine in the simulators here in Houston at the Manned Spacecraft Center. And was discussing what the crew should expect to see using this particular computer routine. In some way the EMP 509 is a procedure that was developed earlier in the flight to prevent a course alignment of the platform. The stable platform used as an attitude reference by the spacecraft due to what was described as a glitch in one of the -- in the coupling data unit in one of the electronics packages in the guidance system which led the guidance system to suspect that the platform had gone out of alignment and activated an automatic procedure which caused the platform to go into course alignment even though, in fact, there was no problem. Now when the platform is course aligned, this in affect destroys the alignment that is in there, requires the crew going through a rather elaborate procedure to realign the platform. The EMP 509 is a procedure developed to bypass this particular glitch. In the event it occurs it is simply ignored.

SC -- they're being snapped.

PAO And that was John Young reporting pictures being snapped. This is part of the SKYLAB contamination study. Taking pictures with a variety of cameras on board in a variety of attitudes. And at one point, the crew will be dumping water to determine the effect of a water dump on the ability of photographic equipment to detect low light level astronomical features. This is, as we said before, is in conjunction with a SKYLAB program, and where we'll be doing quite a bit of astronomical photography and they will be using the ATM -- the Apollo Telescope Mount for astronomical observations. The data that's gained on this mission will be useful in determining how to manage the spacecraft systems during SKYLAB from minimum interference with the photography and astronomy. Apollo 16 at the present time is 98 128 nautical miles from Earth. Traveling at a speed of 5898 feet per second.

END OF TAPE

CAPCOM Uh, 16 would it help you if we called you to advise you when your rates are sufficiently damped? In these different Skylabs --

SC (garble)

SC Don did you call us?

CAPCOM Yeah, we just wanted to know if we could help you by advising you when your rates are damped so you wouldn't have to wait for them.

SC Uh, we -- we're having to restart the sequence but we'll get it this time and we'll be pressing on.

CAPCOM Roger.

SC Houston, when we start the Skylab ducmp contamination, it didn't it dumped a little out the side hatch and then it must have flashed froze or something because it stopped immediately and so Ken, is now removing the screw to see if it still flowing.

CAPCOM Roger, we copy, that.

SC Okay, it's not flowing right now.

CAPCOM Rog. understand.

SC The heaters had been on about 10 minutes before we started.

CAPCOM I'm not sure what you mean by been on about 10 minutes before you started. You mean the dump had started?

SC Yeah, before we started dumping.

CAPCOM Okay, the bag had been on before you started dumping.

SC No, not the bag the heater.

CAPCOM Okay.

SC Okay, it's flowing again.

CAPCOM Roger, understand. And John, I guess using that heaters about the only thing we know to do. If that doesn't work, we don't have an answer for you.

SC That's working fine now, Don.

CAPCOM Okay, thank you.

END OF TAPE

CAPCOM 16, Houston. Since we're going into PTC pretty quick there are about 4 things we need to get done.

SC What are they?

CAPCOM Okay, we need to close the door on the mapping camera laser altimeter and on the X-ray alpha particle we need to make about a 1 minute water dump, we need to dump 5%, and we need to get the gain step up 4 steps.

SC Don, we have another 4 minutes before we take our last sequence of photos here and you don't want to take a water dump till we get through with that, do you?

CAPCOM Negative, you can hold off till after the photos.

SC And we've got the gain step set and we've closed the doors.

CAPCOM Roger.

SC Okay, Don, you said something about PTC, we show we're going to this Signus X-1 attitude next. That's really not what your supposed to do, you want us to go to this auxillary ecliptic first.

CAPCOM That's affirmative.

SC Is that correct?

CAPCOM That's affirmative.

SC Okay.

PAO This is Apollo Control at 272 hours 6 minutes, the crew aboard Apollo 16, is completing a series of photographs and maneuvers and exercises with the CSM as part of the Skylab contamination study. Following this we have relatively little showing on the flight plan, it looks like it'll be a relatively quiet period for the crew up until we put them to bed about 6 hours from now. They will be operating the gamma ray alpha particle and X-ray sensors and the scientific instrument module bay, we also have one more meal scheduled for them, which would be dinner and the sleep period is scheduled to begin at 276 hours. Apollo 16 at the present time is 95 thousand nautical miles from Earth. Traveling at a speed 6,027 feet per second and we're counting down toward entry and splashdown. We now show 18 hours 17 minutes until entry, and 18 hours 30 minutes until splashdown.

SC Okay, Don, we're ready for our dump.

CAPCOM Okay, go ahead.

SC You want us to dump 5%, is that correct?

CAPCOM That's affirmative, it should run about 1 minute.

SC Okay, we're reading 62% when we started, you want us to go to 52%?

CAPCOM Uh, 57, Ken.

SC Okay. Hey, Don, I think we're throught with the water dump.

CAPCOM Okay, it looks good from here. And 16 we'd like to get into a roll as soon as we can because we're running

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CAPCOM kind of close to the limit on some of the
tips.
SC Eject configuration okay, Don?
CAPCOM That's affirmative.
SC You don't want us to bring D-2 on for the
spin up.
CAPCOM Uh, roger, bring a couple on for the roll.

END OF TAPE

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CAPCOM Let's go PITCH minus 40 YAW 90 on the high gain, please.

CAPCOM 16, we got about 10 items to talk about. Most of 'em are real short. We can either try to get to them now, or we can wait a while.

SC We'd like to wait a while. We're in the midst of our reentry stowage.

CAPCOM Okay. One of the items here has to do with reentry - reentry stowage. We'd just like to verify, or have you tell us about any changes that you're making relative to the normal stowage that is, in accordance with page 217.

SC That's where we're working on right now and we'll be certainly going to bed. Beat.

CAPCOM Okay.

SC Okay.

END OF TAPE

SC Houston, 16.
CAPCOM Go ahead, 16.
SC Pete, we're busy with the reentry stowage. Could you keep us on the flight plan if something comes up.
CAPCOM Okay, will do.
SC Thank you.
CAPCOM 16, we're having some thermal problems in the SIM bay, we'd like to stop the roll at 274 degrees and get the sun on the SIM bay.
SC Roger, stop the roll at 274 degrees and get the sun on the SIM bay.
CAPCOM That's affirmative, thank you.
SC Okay, you've got 274 out there, Pete.
CAPCOM Okay, John. Thank you.
PAO This is Apollo Control at 273 hours 3 minutes. We've had the crew stop the passive thermal control, a slow rotation of the spacecraft because of a cold spot that our Orbital Science officer had been watching in the Scientific Instrument Module Bay. We're going to have them hold in an attitude where the sun is shining on this bay for about 30 minutes. That should warm it up and at that point we'll have them go back into the passive thermal control mode rotating at about 3 revolutions per hour. The feeling is that at that point the cold area of the SIM bay will get a chance to warm up. In the previous attitude, that area was cold soaking pointed away from the sun and the passive thermal control was simply not bringing the temperature up as rapidly as OSO, the Orbital Science Officer would have liked, so we stopped the passive thermal control rotation pointing the SIM bay at the sun and letting it warm up for about 30 minutes before reentering the PTC or passive thermal control. Apollo 16 is 91 358 nautical miles from earth and the velocity is now creeping upward from 6000 feet per second. We're showing 6166 feet per second at the present time.

END OF TAPE

CAPCOM 16, we think we may have stratification in H2 tanks 1 and 2. Would you give us about one minute on fans?

SC Roger. H2 tanks 1 and 2, one minute on the fans.

CAPCOM 16, we've noticed the cabin pressure dropped about a tenth and the O2 flow go up a little bit. Are you doing something that might have caused that?

SC Ah, negative, sure not.

CAPCOM Okay, and also we have a maneuver for you. We'd like you to do the VERB 49 maneuver to the X-ray pointing thermal attitude sig X1. It's at 273 15 in your flight plan, but I'll read you the angles, if you want.

SC Appreciate it.

CAPCOM Okay, it's 278, 295, and 310. And the high gain angles are PITCH 11 and YAW 330.

SC Roger. PITCH 11, YAW 330, attitude 278 295 310.

CAPCOM That's affirmative.

SC Okay, we're going there now.

CAPCOM Okay. And we're watching the cabin pressure. It's steady again, now.

SC Hey, Pete, it looks about like where it's been to us. We think it's been hanging a little bit below 5.

CAPCOM Yeah, that's affirmative and EECOM says that could be the cabin rigs making up that's causing what he's seeing.

SC Okay.

END OF TAPE

SC Okay, Houston, you want us to dump the OPS again? We would like to finally stow it and we can dump it now if you want.

CAPCOM Okay, we would like to use the OPS to get the cabin up to 5.6, and then leave it in bleed flow through the sleep period.

SC Okay, that bleed flow means leaving the holes in the fork and leave it on right?

CAPCOM Standby a minute, John, I'll check.

CAPCOM 16, we need you to check that dump in the hatch where you just made the SKYLAB dump from. We're still showing a little high on the O2 flow.

SC Flow just went to 2/10 here, Pete.

CAPCOM Yeah, Rog, EECOM's just calling. We're seeing it drop off here now. Okay, on the OPS configuration we want the OPS connector locked in the storage plate, and turn the OPS actuator to ON. Next, after, you pump the cabin up.

SC Okay, that's what we'll do.

CAPCOM 16, on the high gain, I think the angles we called up before are wrong. Let's go pitch 55 yaw 323.

SC Okay, we're at 'sco X 1 attitude, I guess you know.

CAPCOM Rog, then go wide on the high gain.

SC Uh, Pete it doesn't seem to be acquiring in REACQ I stepped it through.

CAPCOM Okay, and Charlie, did you copy to try 55 degrees on pitch and 323 on yaw. The first set of angles we called up were not correct.

SC Okay, my mistake.

CAPCOM No, Charlie, that was our mistake. The first set of angles we called up were wrong.

SC Okay, 55 and 323.

CAPCOM Affirmative.

SC Okay, Houston, we got it turned on and it's got about 200 pounds in it, just barely making any noise.

CAPCOM Roger. And 16, would you give us gamma shield OFF please.

SC Okay.

CAPCOM Okay.

CAPCOM 16, with the OPS flow, we're still looking at an O2 flow that is higher than normal. And we'd like you to take a look at the nozzle on the hatch window there -- on the hatch there, make sure that it's secured.

SC Okay, Pete. We'll reinstall it. I got the cover hand -- tight as I can get it, and we'll take the cover off and reinstall the nozzle.

CAPCOM Okay, Charlie.

APOLLO 16 MISSION COMMENTARY 4/26/72 273:36GET 20:44CST MC-891/2

CAPCOM Okay, Charlie, looks like the O2 flow is
down to about what we would expect now.

SC Okay, Pete, we're cleaning off the suit
return hoses, and the inlet to the suit's circuit.

CAPCOM Roger.

CAPCOM 16, would you verify the H2 tanks 1 and 2
fans off, please.

SC That's affirmative.

CAPCOM Okay, thank you.

END OF TAPE

CAPCOM
fans off, please?

16, would you verify the H2 tanks 1 and 2

SC That's affirmative.

CAPCOM Okay, thank you.

CAPCOM Uh, 16, we need the X-ray off for 2 seconds and then back on, we're trying to keep it out of the attenuate mode for the next few minutes here.

SC Roger. You have it, Houston.

CAPCOM Thank you.

PAO This is Apollo Control at 274 hours 5 minutes
The crew aboard Apollo 16 at the present time is primarily involved in operating the SIM bay instruments. The gamma ray alpha particle and X-ray spectrometer, they also have an eat period coming up at about this time. And we plan to put them to bed 276 hours or about 2 hours from now. We've had relatively little conversation with the crew, one of the last items discussed was fluctuating cabin oxygen pressure, it turned out that this fluctuation was caused by apparently dirty screens on a cabin inlet outlet vents for the oxygen flow and once the crew cleaned these off which is a normal procedure the flow rate settled down to a steady level. Also we've discussed with them the OPS pressure, this is the oxygen purge system, one of two emergency units carried by the 2 crewmen on the lunar surface on top of their portable life support systems, these are available to provide emergency oxygen and cooling, on the lunar surface, one of these OPS units is carried back into the command module following the lunar surface activities and is available for any contingency during the command module EVA, that now behind us it's desirable to get the OPS which starts out with a very high pressure, somewhere around 5900 pounds per square inch on the lunar surface bled down to virtually nothing at entry. The OPS has been used for the last couple of nights to pump up the cabin, prior to the crew sleep for they pressurize the cabin, let the pressure up and let it gradually decay down from the normal level, by the time they awake, using the OPS provides this surge of oxygen rapidly bleeds its pressure down, it's down now to about 200 pounds per square inch and the crew is allowing the remaining approximately 1 quarter of a pound of oxygen that remains in the bottle to bleed off we expect that it will be down very close to zero, if not at zero, by the time the spacecraft reenters tomorrow. And we're now showing entry 16 hours 16 minutes away, splashdown 16 hours 29 minutes from now. Apollo 16 at the present time is 87,550 nautical miles from Earth traveling at a speed of 6,329 feet per second.

CAPCOM 16, we're asking for some stuff it's at 273:50 in the flight plan. We need a report on the command module RCS injector valve test.

SC Okay, it's in work.

CAPCOM Okay, do you want me to give you the call out on the system test meter position or not?

SC No, we can figure that out probably.

END OF TAPE

SC Okay, it's in work.
CAPCOM Okay, do you want me to give you a
call out on the systems test meter positions or not?
SC Oh, we can figure that out, probably.
SC Pete, 5 Charlie is 4.3, 5 Delta is 4.6
6 Alpha is 4.2, 6 Bravo is 4.4, 6 Charlie is greater than
5 and 6 Delta is 4.4.
CAPCOM Roger, copy. And also, we'd like to
remind you of a LIOH canister change, 23 in the Bravo and
stow 21 in A5.
SC Okay.
CAPCOM 16, we need the gamma ray shield ON.
SC Okay, you have it.
CAPCOM Roger, thank you. And Charlie, you
let us know when you get the LIOH canister changed.
SC Okay, I'm done right now.
CAPCOM Roger. And 16, we've got a new attitude
for you. The angles are 164 134 035, high gain angles
PITCH minus 23, YAW 101.
SC I got it Pete. Thank you.
SC Okay, the LIOH canister's changed.
CAPCOM Roger, copy.
CAPCOM Okay, 16, let's try to bring the high
gain up.

END OF TAPE

CAPCOM And 16, I'm still sittin here with about 6 items, a couple of which require readings, most of them just require a little talking. Anytime you can get to it, well, let's get started on it.

SC Okay, just as soon as we get the can on comm.

CAPCOM Roger.

SC Hello, Houston.

CAPCOM Go ahead, 16.

SC Understand you have a few words.

CAPCOM Rog, First of all I guess we wanted to check with you on any changes to entry stowage, in particularly the LiOH canisters, to check that they are stowed according to the entry stowage list.

SC LiOH canisters are stowed according to the entry stowage list, and the entry stowage is essentially complete except for the items that we need to work out tomorrow and of course tying down the suit under the right hand seat.

CAPCOM Roger.

SC Okay, there's a couple of things that we couldn't stow as per nominal, they are the fecal bag and the goodie bag and we intend to tie those down in the LEB. The goodie bag is the LM data file. (garbled)

CAPCOM Roger, understand LM data file and the fecal bag are going to be tied down in the LEB.

SC That's affirmative. And we know we can tie those down enough to withstand any kind of reentry and might even help Delta over V. I - Do you know how much the LM flight data file weighs less the contingency checklist and the time line book. That's a total - mostly the total weight of that bag.

CAPCOM Roger.

CAPCOM Okay, we also need the battery compartment one more time before you go to bed tonight and I guess if you want to, we could get that out of the way right now.

SC 2.75.

CAPCOM Understand 2.75.

SC That's affirmative.

CAPCOM And, Charlie, we want you on the biomed tonight and it looks like we are going to have to reverse the top 2 sensor wires, because apparently - either you got that hooked up backwards or the signal turned around somewhere in the transmission.

CAPCOM Charlie, that's if you want to reverse it.

SC Yeah, is the lon - the long ones the ground isn't it?

CAPCOM Negative. Standby just a minute.

CAPCOM Okay, Charlie, the long one goes to the

CAPCOM sternum and the branching one goes off to the right.

SC Well, I got 'em on like I been wearing them all week.

CAPCOM Roger.

CAPCOM Okay, and the surgeons wanted you to know they appreciated your status - good status report you gave them this morning and they hope you can find time to give them a good one tomorrow morning.

CAPCOM Okay, we got one more item. We just want to make sure that we don't get any uncoupled attitude control after 277 hours GET, that's to insure that we get precise tracking for at least 10 hours prior to midcourse 7.

SC Okay, I'm as interested in that as you are.

CAPCOM Roger.

CAPCOM Okay and I guess we have some news items here for you. And I think that will wrap it up.

SC Okay, go ahead.

CAPCOM Okay. I guess the biggest news was that President Nixon went on national television tonight to discuss the military situation in Viet Nam. He said efforts toward Vietnamization of the war were proving effective and he announced withdrawal of 20 000 men --

END OF TAPE

SC Okay, go ahead.

CAPCOM Okay, I guess the biggest news was that President Nixon went on national television tonight to discuss the military situation in Viet Nam, he said efforts towards Vietnamization of the war was proving effective and he announced additionally U.S. troop withdrawals of 20 thousand men by July 1. At the same time the President characterized the current North Vietnamese advances into South Viet Nam as an open invasion and he said U.S. Air and Naval forces will continue to attack North military targets in North Viet Nam to assure the safety of remaining U.S. forces in South Viet Nam and to prevent a military take over of South Viet Nam by the North. The president also said U.S. negotiators would return to the Paris peace talks as he put it, "To get on with the constructive business of obtaining peace. The first order of business he said will be to get the North Vietnamese to stop their invasion and to secure the release of Americans being held prisoner." And we got an item here on Apollo 16, the headline says, "Spaceship Speeds Up Zeros in on Earth" "Apollo 16 picks up speed today from the gravitational embrace of Earth as scientist await the delivery of samples that may rewrite the history of the Moon. Astronauts John Young, Charlie Duke and Thomas Mattingly, II, are due to enter the atmosphere of the Earth thursday afternoon at 24,000 miles per hour. Apollo 16 is returning 243 pounds in Moon samples. The flights legacy consists of more than just rocks. Mattingly spent an hour walking in space, Tuesday, to retrieve 2 holders containing the exposed film of powerful mapping and panoramic cameras. With only 1 mission remaining in the Apollo program the cameras pictures taken from lunar orbit are expected to provide much knowledge about areas of the Moon that man will not visit for a long time." And a little bit on the democratic campaign here, "Muskie dealt 1 2 blow by McGovern in Massachusetts and HHH in Pennslyvania. Senator George McGovern triumphant in Massachusettes. Senator Hubert H. Humphrey the Pennslyvania victor joined head on political battle today after dealing a 1 2 blow to the presidential campaign of Senator Edmund Muskie. Muskie finished in far back second in Massachusetts and managed only a virtual third place tie with McGovern and Wallace in Pennslyvania, where he concentrated his campaign. Alabama Governor George C. Wallace, got 21% with 97% of the precinct tallied in Pennslyvania after staging a 1 day campaign. Massachusettes gave Wallace 8% of the vote in partial returns just ahead of Humphrey. Next tuesday McGovern and Humphrey confront each other. Muskie and Senator Henry M. Jackson of Washington, in an Ohio battle for 153 convention delegates." A couple of items on the reentry area, "The USS Ticonderoga, the primary recovery ship for Apollo 16, has arrived at the new splashdown site, 1500 miles south of Honolulu, the forecast for thursday splash is unlimited visibility with temperatures in the 80s. Seas are expected to be 1 to 3 feet with swells to 5 feet. And the weather here in Houston, is low tonight in the low 60s, high thursday in the low 80s and the

CAPCOM weather's been clear to partly cloudy today. And the Houston Astros did it again, they won their 8th consecutive baseball victory last night. A hard fought 5 to 4 verdict over the Chicago Cubs. The win kept Houston in a tie with Los Angeles for first place in the national league win. And lets see I guess we'll play--

SC Go get em Astros. It's a big atta boy for the Astros.

CAPCOM Rog. And we got one last item here which is entitled "Slick Trick by an Eager Beaver" from Flint, Michigan. "Dedication to duty is fine say Flint city officials but the man who turned several miles of city streets into an ice rink carried that concept too far. He'd been told to use the city water truck to wash the streets tuesday morning he did. Dutifully ignoring the 3 degrees below freezing temperature. His trail was clearly marked by irate drivers trying to navigate their dented cars over the glassy surface. Official said salt crews were dispatched but the sun came out and melted the problem before they did."

SC Thanks a lot, Pete.

CAPCOM You bet.

SC Yeah, that's the way the Rover drives. Like it's on ice.

CAPCOM Rog.

SC We appreciate that good news Pete.

CAPCOM Rog.

END OF TAPE

SC We appreciate that good news, Pete.

CAPCOM Rog.

PAO This is Apollo Control at 275 hours 19 minutes, and we've heard relatively little from the crew for the last 30 minutes or so. Earlier this evening they've been involved in getting everything stowed and ready for the entry and splashdown tomorrow, which is now some 15 hours 17 minutes away. They also have a number of the instruments in the scientific instrument module bay in operation -- the gamma ray alpha particle and X-ray sensors. And they should be in the midst of an eat period, getting their dinner prior to retiring for what will be their last night of sleep aboard Casper. We do have one more midcourse correction planned prior to entry into Earth's atmosphere. That will be midcourse correction number 7 which occurs at 287 hours 22 minutes 56 seconds. This will be a 7 second burn of the reaction control system thrusters to produce a change in velocity of about 3.1 feet per second. The purpose of this maneuver is to drop the angle of entry interphase, the angle at which the spacecraft enters below the horizontal from it's current value of negative 6.15 degrees to the nominal of about 6 and half. Splashdown is scheduled to occur at -- rather entry is scheduled to occur at 290 hours 23 minutes 32 seconds with splashdown about 13 minutes 22 seconds following entry into Earth's atmosphere. At the present time Apollo 16 is 82 900 nautical miles from Earth, traveling at a speed of some 6500 feet per second.

END OF TAPE

SC Hey, Don.
CAPCOM Go ahead.
SC What would you folks think about my going to whatever attitude I'm going to do my PTC in tonight and get it all damped and ready to set up?
CAPCOM Stand by a minute.
SC Okay.
CAPCOM Okay, Ken. You can go ahead.
SC Okay, and that's a PITCH of 43 and YAW of 335, is that affirm?
CAPCOM That's affirmative.
SC Okay, sir. And this PTC will be a normal PTC with no engines enable, correct?
CAPCOM I believe that's right, Ken. Stand by 1.
SC Houston, 16.
CAPCOM Go ahead.
SC Okay, it looks like we've got a H2 tank 1, it's a little above the green line about at 270. Oh excuse me that's the one we said had the bad sensors. Excuse me.
CAPCOM Roger. And Ken, that is a normal PTC.
SC Thank you sir.
CAPCOM Okay, Ken. And in connection with that, we want to verify that the PITCH is minus 40, the YAW is 90 on the high gain.
SC That's verified.
CAPCOM And -
SC And Pete - I was ready to sack out. Did you all come to any conclusion about this biomed?
CAPCOM Charlie, you can leave it just like it is.
SC Thank you.
CAPCOM And one other item we need, I guess is a readout on battery C and pyro batteries A and B voltage. This will be the last chance we get to look at them.
SC Okay, stand by. Battery C is 36-1/2, and pyro bats are both 36-1/2.
CAPCOM Roger, copy. Thank you.
CAPCOM Okay, and Ken, we need an E mod, and we're ready to call it a night.
SC Okay, I guess I could do that while we're doing the maneuver.
SC Don, I've got one more question for you.
CAPCOM Okay, go ahead.
SC When it comes time to change REFSMAT,

SC to go to reentry REFSMAT tomorrow, I've been thinking about our funnies with the CDU's and when we were looking at that one this afternoon, it some way was hinted that maybe we didn't have all that D to A and A to D stuff working the way it ought to. Would there be any advantage of - maybe somebody could think about it tonight, maybe they already are, about, is there any advantage to doing a pulse torque to change REFSMAT's tomorrow instead of by the usual procedure of using the course aline.

CAPCOM Okay, understand what you're asking. Stand by just a minute.

END OF TAPE

SC Is there any advantage to doing a pulse torque to change REFFSMATS tomorrow instead of on the usual procedures of using the coarse line?

CAPCOM Okay. I understand what you're asking. Stand by just a minute. Okay, Ken we'll work on that and get back to you first thing in the morning we'll - -

SC Okay. I don't have any strong druthers I just - - I was thinking over the things we might be going through and kidna wondered if that might be prudent if I avoided that loop. But if everybody's happy with it, it's certainly a lot easier to course line.

CAPCOM Okay. We'll take a good close look at it tonight and let you know in the morning first thing.

SC Okay. Thank you.

CAPCOM Roger.

SC Don, I'm going to be off comm for about 3 or 4 minutes.

CAPCOM Roger. I understand.

PAO This is Apollo Control at 276 hours 2 minutes. For the past two hours or so the Apollo 16 crew has been busily storing things. Getting things ship shape aboard Apollo 16 and ready for tomorrow's entry and splashdown. They have just about completed that and have wrapped up all their flight plan activities prior to beginning the sleep period. They're now getting the spacecraft stablized and ready to - -

SC Back up

PAO That was Ken Mattingly.

SC Do the rates look reasonable for PTC?

CAPCOM Rog. The rates look real good. You can go ahead.

SC Okay. We'll see what happens.

PAO And from our telemetry indications here on the ground we can see that Ken Mattingly is now starting to spin the spacecraft up. It'll be rotated at about 3 revolutions per hour which is normal mode for sleep where the spacecraft is exposed equally on all sides to sun light and alternately to the black cold of space. This maintains the proper temperature equilibrium. Apollo 16 at this time is 80 305 nautical miles from Earth. And the spacecraft velocity is 6667 feet per second.

SC Tom, we're about ready to sign off. Is there anything else that you'd like to do tonight. Anything we have out of configuration that you're aware of.

CAPCOM I don't think so Ken but stand by one minute. Okay, Ken we're all squared away. Get a good sleep. We'll see you in the morning.

SC Okay. Thank you very much. Good night.

CAPCOM Night.

END OF TAPE

PAO This is Apollo Control at 276 hours 38 minutes. We said goodnight to the crew aboard Apollo 16 nearly 25 minutes ago and they're scheduled to sleep for some 8 hours. At about 12:30 Houston time the INCO, Instrumentation and Communications Officer here in the Control Center plans once again to activate the television camera aboard the lunar roving vehicle at the Descartes landing site and move it around via the remote control setup here in the Control Center to look at various features at the landing site. The terrain around the landing site, hills and interesting rocks. The camera lens did get a fairly good dusting when the lunar module lifted off and we don't expect to find the camera very useful for looking at astronomical objects such as the Milky Way and Magellanic clouds. These were some of the items that had been considered as possible targets for post liftoff TV however, the television picture is apparently not useful for such difficult to see under the best of conditions astronomical objects. We will not have a change of shift briefing during this -- at the end of this shift. In Mission Control right now, we're in the process of handing over Flight Director Jerry Griffin and the gold team coming on to replace Flight Director Don Puddy and the orange team of flight controllers, the spacecraft communicator on the upcoming shift is Astronaut Tony England. Apollo 16 now 13 hours 57 minutes away from splashdown.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/26/72 CST 23:48 GET 276:41 MC900/1

PAO This is Apollo Control, 276 hours
52 minutes ground elapsed time in the Mission of Apollo 16.
Streaking homeward at 6,828 feet per second, now 77,139
nautical miles out from Earth, the crew is asleep at this
time, having signed off about a half hour ago and turned
off their voice downlink. Splashdown 13 hours 43 minutes
away. We'll take down the air-to-ground circuit at this
time. Should the crew awake and commence talking again,
we'll bring it up. At 276:53, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control 278 hours 47 minutes into the Mission of Apollo 16. Some 11 hours 49 minutes away from splashdown in the Central Pacific. A short while ago the ground commanded television assembly at -- still on the Rover at the Descartes landing site was activated panned around looking at the landing site and the artifacts left there by the Apollo 16 crew. The lunar module descent stage looking rather like a dead spider sitting in the foreground. Crew's still asleep at this time, probably be awakened around 8 am central time. Spacecraft nearing the Earth and now 69,310 miles out. Velocity continuing to build up now 7,267 feet per second. In some 11 hours 34 minutes as the spacecraft encounters the atmosphere at 400,000 feet, that velocity will have built up to 36,196 feet per second. Flight path angle for entry still showing on the display as minus 6.15 degrees, relative to the local horizontal at the landing -- at the splashdown point or entry interface point. At 278 49 this is Apollo Control.

END OF TAPE

APOLLO 16 MISSION COMMENTARY, 4/27/72, 02:54 CST, 279:47 GET, MC-902/1

PAO This is Apollo Control, ground elapsed time of 279:47, 2:55 AM Central Standard Time. Apollo 16 presently 65 141 nautical miles out from the earth, approaching at a velocity of 7529 feet per second. Apollo 16 crew asleep, no words since their last sign-off at about 11:30 PM last evening. They have slightly over 4 hours remaining in the scheduled sleep period, which will end at a ground elapsed time of 284 hours. Splashdown is some 10 hours 48 minutes away in the south central Pacific. Weather in the landing site, clouds at 2000 feet scattered, visibility 10 knots - 10 nautical miles, wind out of the east at 10 knots, wave height 3 feet, Ticonderoga nearing the splashdown point. And a 279:48 this is Apollo Control.

END OF TAPE

PAO This is Apollo Control, 281 hours 47 minutes ground elapsed time. Apollo 16 crew still asleep, with some 2 hours 12 minutes until reveille on their final night's sleep on their homeward journey from the Moon, only 56,186 miles out. A quarter million mile journey back from the Earth's satellite, velocity continuing to build up as the gravitational pull of Mother Earth gets stronger. Velocity now 8,173 feet per second, cabin temperature aboard the Command Module holding at 4.9 pounds per square inch, cabin temperature as shown by telemetry reading 68 degrees Fahrenheit. Data - biomedical data - coming down from the Spacecraft is available only on the Lunar Module Pilot, with his heart rate in the upper 30's and 40's - low 40's, his mean heart rate. Splashdown in 8 hours 47 minutes from now in the South Central Pacific. Recovery force on station, the prime recovery vessel, U.S.S. Ticonderoga. At 281:49, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control 282 hours and 47 minutes ground elapsed time. 7 minutes - as you were - 7 hours 49 minutes until Apollo 16 splashes down in the Central Pacific some 1,300 miles south of Hawaii. On 12 minutes remaining in the crew rest period. Spacecraft now 51,330 nautical away from Earth. Velocity 8,504 feet per second. Downtrack on this particular entry will be running almost to the due north as the spacecraft makes its final plunge into the atmosphere. Inclination of some 70 degrees whereas the limits in earlier missions have been more like 40 degrees. They are apparently sleeping soundly at this time. There's been no contact with the crew by voice for more than 6 hours. All looking good for tomorrow - this afternoons entry and splashdown and at 282:49, this is Apollo Control.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/27/72 CST 07:07 GET 283:58 905/1

HONEYSUCKLE Honeysuckle on net 1.
CAPCOM This is Houston comm. Dick, I read you loud
and clear. Thank you Honeysuckle.
HONEYSUCKLE Loud and clear also.
CAPCOM Rog.
PAO This is Apollo Control through 283 hours 58
minutes ground elapsed time. 1 minute away from wakeup call.
Spacecraft communicator Tony England, standing by for good
antennitive swing by on the spacecraft before making his reville
call. Apollo 16, 45,306 miles out from earth. Velocity building
up fairly rapaidly now, 9,174 feet per second. When Apollo 16
enters the atmosphere, some 6 hours and 24 minutes from now, it
will be traveling 4 times as fast as it is now. We have con-
firmation of the high gain locked in. Here goes Tony England.
CAPCOM Good morning Apollo 16.
CAPCOM Good morning, good morning up there.
SC Good morning, good morning down there.
CAPCOM Well, we see on this BIOMED that old Charlie
wakeup. He was really sawing a way there.
SC Charlie was sawing away on his BIOMED?
CAPCOM Sure was.
SC I wouldn't be surprised. That's why it doesn't
work.
SC Termites do the same thing.
CAPCOM Apollo 16, Houston. Would you switch your
HIGH GAIN to medium.
SC Yea, medium on HIGH GAIN.
CAPCOM Okay.
CAPCOM Apollo 16, Houston.
SC Go ahead, over.
CAPCOM Okay, we've only got one minor change to your
flight plan. Some HIGH GAIN angles for a P52 to 285:48. When do
you want it.
SC Okay, go ahead.
CAPCOM Okay. PITCH minus 28, YAW 96. And Stu will
be in in a little while to talk about changes to your entry check
list. But that should do it for the flight plan. All your systems
looked normal through the night. We don't know about the midcourse
7 yet. Right now you in the quarter and it looks, it looks pretty
good like maybe you won't have to do one. If you did one, it wouldn't
be any more than a foot and a half.
SC Understand.
CAPCOM You're just slightly shallow. It'll give you a
little softer ride. And could you go wide on the HIGH GAIN please.

END OF TAPE

CAPCOM And could you go wide on high gain, please?
SC High gain, wide.
CAPCOM Thank you.
CAPCOM 16, Houston.
SC Go ahead, over.
CAPCOM Okay, John. This is go flight. We're going to be handing it over down here shortly and that last shift with you, we wanted to let you know that we really commend you for job well done and be looking forward to seeing you when you get back to Houston.
SC Okay, go flight. I tell you, we certainly enjoyed you particularly on the that descent. That was something else, wasn't it?
CAPCOM It was a pretty long day. I'm sure it was for you. I'm sure it was for us.
SC You bet.
SC Jerry, thanks for everything. We'll be seeing you when we get back.
CAPCOM Okay, Charlie.
CAPCOM Incidentally, I talked to Lee yesterday, and he sends you all a very well done.
SC Thank you.
SC Tony, you still there?
CAPCOM Yeah. Go ahead.
SC Would you have your friend take a look at my biomed?
CAPCOM Okay.
CAPCOM He says you look healthy.
SC Okay. Thank you.
CAPCOM Incidentally, I think Lee's comments really means you passed the course. I hope so anyway.
SC If we didn't, we'd like to go back and try again.
CAPCOM That would be a good deal, wouldn't it?
SC Yeah, maybe you can fix that up for us, so we can go back and try it again.
SC There's another 4 or 500 pounds up there, Tony, that we'd like to bring you.
SC We didn't make Lee's ton a year here but we're working on it.
CAPCOM Yeah, if you don't get a ton. Lee's going to be disappointed. No, I don't think so, I think he's pretty happy.
SC Okay, Houston. We're got the crew's status report.
CAPCOM Go ahead.
SC Okay. For the commander, A-1 is still stow, A-3 is 7 hours, A-4 is not, A-5 is 1725 --

APOLLO 16 MISSION COMMENTARY 4/27/72 CST 7:30 GET 284:22 906/2

CAPCOM John, we lost COMM there about the CDR's
A-5, if you can do that one again, please.

SC Okay. A-5 1725 and 1686, his 1 is 8, 2
is 4, 3 is 6, 4 is 5, 5 is 8. All those quantities are in
ounces.

CAPCOM Okay.

SC CMP, B-1 15072, B-3 6 hours, B-4 none,
B-2 is 40 and 50, B-6, 1 is 5 ounces, 2 is 6 ounces, 3, 5 ounces,
4, 5 ounces.

CAPCOM Okay.

SC On the LMP, C-1 21180, C-3, 7 hours, C4, none,
C-5, 18 25, 15 C-6 5 ounces, number 1 is 5 ounces, number 2 is
7 ounces.

CAPCOM Okay. We copy that.

SC Okay, back to the chow. Yesterday, we
were working on day 11 food and we -- for the CDR, PLA, scratch
the coffee with K. POB, scratch the rye bread, change to the
spread to two-thirds, and change the tuna spread from tuna
spread to ham salad, and change the cocoa and K to citrus
beverage with K.

CAPCOM Okay.

SC And on POC, scratch the Romain soup and
the pecan and add one half tuna salad.

CAPCOM Okay.

SC On the CMP, for breakfast, scratch the
grits, POB, scratch the grapefruit bar and the graham crackers --

END OF TAPE

SC For breakfast, scratch the grits.
Meal B, scratch the grapefruit bar and the graham crackers,
Meal C, substitute ham for beef steak, scratch the chicken
and rice and scratch the pecans, scratch the grape drink.
Add orange-pineapple drink, gingerbread and also an orange-
grapefruit drink.

CAPCOM Copy.

SC And on the LMP for breakfast scratch
the bacon squares from meal A, Meal B scratch the lobster
bisque and rye bread, wait a second here, somebody's got a
little disagreement on what we ate here. It's not, inci-
dentally, the first time that that's happened.

CAPCOM We'd like you to get started toward
that galactic anti-centerpoint attitude, whatever that is.

SC Okay, we're going that way.

CAPCOM Okay.

SC Okay, let's start over on Meal B for
the LMP.

CAPCOM Alright.

SC I've been corrected here. Do not
scratch the lobster bisques and substitute for tuna spread,
ham spread and do not scratch the rye bread, scratch the
cherry fruit bar and the citrus beverage with K and substi-
tute the cocoa with K.

CAPCOM Okay.

SC On meal C, scratch the beef steak,
scratch the fruitcake and the pecans and add tuna salad,
3/4 of a tin.

CAPCOM Okay, got it.

SC Okay, and the injector valve tamps are
looking as follows, 5 feet 4.4 5D 4.6 6A 4.1 6B 4.4 6C 4.9
6D 4.4, which means no heat up.

CAPCOM Okay, copy that.

CAPCOM Apollo 16, we'd like AUTO and high
gain.

SC You have it.

CAPCOM Hey fellows, Hank's here, and have a
good ride in and see you in a couple of days.

SC Okay, thank you much, Tony.

CAPCOM You betcha.

SC We certainly enjoyed working with you,
Tony.

CAPCOM Thank you.

PAO This is Apollo Control Houston at
285 hours ground elapsed time. We now show Apollo 16
at a distance of 39 820 nautical miles away from the earth.
The velocity now reads 9807 feet per second and in the

APOLLO 16 MISSION COMMENTARY 4/27/72 CST 7:49 GET 284:41 907/2

PAO Mission Control Center in Houston,
we've had a shift changeover. Phil Shaffer is now our
Flight Director. Our CapCom is now Henry Hartsfield.
We're at 285 hours ground elapsed time and this is Apollo
Control Houston.

END OF TAPE

SC Okay. We just got it again.
CAPCOM Roger. Copy.
SC And, Houston, this time we've got the ISS
light on and it's remaining on.
CAPCOM Roger. Copy, Ken.
SC Program alarm was resetable, as you probably
noticed.
CAPCOM Roger. But you still have the light, is
that affirmative?
SC That's affirmative
SC Affirm.
SC Okay, Houston, could we proceed through
malfunction number 6 here.
CAPCOM They're debating that, Ken. Just a second.
SC Okay. The NOUN 20 to check with the FDAI
very closely.
CAPCOM Okay. Ken, why don't you press on through
that malfunction 6 there on page 28 and remember if you get
down to box 12 you have to tilt the DAP.
SC Okay.
CAPCOM Do you have any questions on tilting the
DAP, Ken.
SC No, sir.
PAO This is Apollo Control, Houston -
SC When I went to do a VERB 40, just about
the time it should have run it's time out and blank the DSKY
we got another program alarm and it shows 3777 again.
CAPCOM We'll have to see about that.
PAO This is Apollo Control, Houston, at 285 hours
16 minutes ground elapsed time. You heard the report from
Ken Mattingly. We have a recurrence of yesterday's program
alarmed, this the inertial subsystem warning light on. At
this point, however, the light remains on. We'll stand by
and continue to monitor. We show Apollo 16 at a distance
of 38 327 nautical miles away from Earth, now traveling at
a speed of 10 000 feet per second.
CAPCOM Do you still have the ISS light, Ken?
SC That's affirmative.
CAPCOM 16, Houston. We'd like to proceed with
a malfunction procedure.
SC Okay. Would you like to do block 6 again?
CAPCOM Stand by, Ken. They're looking at it.
They're speculation we've got a - the bail bit set and stuck
there.
CAPCOM Okay, Ken. Let's proceed with block 6 and
then go on down to 12 and by that we're going to see the same
thing all over again, but let's try it.
SC You say skip block 6?
CAPCOM Negative. Let's do block 6 again.

APOLLO 16 MISSION COMMENTARY, 4/27/72, 3:09 AM CST, 285:01 GET, MC-908/2

PAO Block 6 is the malfunction procedure which was followed yesterday when a similar kind of problem developed. We're at 285 hours 20 minutes ground elapsed time, this is Apollo Control, Houston.

SC Same thing, Hank.

CAPCOM Okay. Understand.

SC Okay, Hank. I'm not sure how to answer block 6. I'll go to block 12 if you like.

CAPCOM Stand by a minute, Ken.

CAPCOM Okay, Ken. We can see that input channel bit and it's set and it's staying set so we think there's no need to proceed any further.

SC Okay. Do you have any way of isolating whether it's the business set or whether it's receiving continuous input.

CAPCOM Okay. Everybody's looking at that now. We're trying to track out what's going wrong here.

SC Okay. Thank you, sir.

END OF TAPE

CAPCOM 16, Houston. That (garble) at the input channel bit just cleared. Did you do anything.

SC No, sir. And the ISS light is out.

SC Let me tell you what the only thing we can think of that might have happened. Charlie's down in the alley B and tool E, it sounded like got knocked against the panel down there, if you can believe that.

CAPCOM Tool E hit the panel and the light went away?

SC That, we can't say that for sure. That's the only action that I can think of that was going on at the time. I'm not even sure that was. I just heard a clank.

PAO That's John Young speaking from Apollo 16, now. We're at 285 hours 29 minutes ground elapsed time. As you just heard the program alarm just cleared. However, if the alarm light persisted, this does not mean that the Apollo 16 can't use the guidance and navigation system for entry. But if another problem developed with the inertial subsystem, we would not get the ISS alarm. What Apollo 16 would really be giving up would be an ISS fail indication, but we would receive a gimbal lock alarm or indication if this developed. We're at 285 hours 30 minutes ground elapsed time. We show Apollo 16 at a distance of 37,094 nautical miles away from the earth, and traveling at a velocity of 10,168 feet per second.

CAPCOM Apollo 16, Houston. We would like to get on with the activity at 285:30 regarding to SIM Bay, however, we would like to leave the gamma ray shield on. We don't want to take it off.

SC Okay.

CAPCOM Ken, looks like the gamma ray boom is not going to come in any further. We've seen it stalled, but it is safe for it's in a safe position. You can go ahead and turn the boom switch to off. And for planning purposes, we are going to do a midcourse 7 at about 1 and a half feet per second.

SC Okay, thank you.

CAPCOM Okay.

SC We'll turn the gamma ray boom to off. Hank, do you folks want us to go ahead and try the 52?

CAPCOM Roger, Ken. We would like to do the P52, and since the problems cleared up, I imagine you can use the VERB 49 maneuver.

SC We'll certainly give that a try. Hank, do we have the entry REFSMMAT plugged in yet?

CAPCOM Stand by.

CAPCOM If you'll give us ACCEPT, we'll pump your loads up to you.

SC Okay, you have it.

CAPCOM We're sending you a state vector, a target load, and a REFSMMAT

APOLLO 16 MISSION COMMENTARY 4/27/72 CST 08:34 GET 285:27 909/2

CAPCOM Apollo 16, I have your MCC 7 PAD.

SC Okay, go ahead, Hank.

CAPCOM Roger. MCC 7, RCS G&N, 27276 NOUN 48 is NA,
NOUN 33, 28723 0026 minus 000 1.4 plus all zips plus 4 balls 1
180 310 000. HA NA plus 00217 000 1.4 004 000 1.4. Sextant
star 13, 3127 337. Four site star NA. NOUN 61 minus 0071 minus
15618 10458 36276 290 23 59. Sirius and Rigel 279 045 014. 4 jets.
Remarks EMS not bias for drift. HIGH GAIN angles PITCH minus 85
YAW 119. End of PAD, and the computer is yours.

SC Okay. MCC 7, RCS G&N 27276 NOUN 48 not applicable.
28723 00.26 minus 3 balls 1.4 plus all balls plus 0000.1 180 310
000. HA is not applicable. 21.7. Delta VT 1.4. Burn time 4 seconds.
Delta VC 1.4. 13 Sextant star, 312.7 33.7. Latitude minus 7.1
longitude minus 156.18. 1045.8 36276 290 23 59. Sirius and Rigel
279 045 and 014. 4 jets plus X. EMS not bias for drift. PITCH
on HIGH GAIN minus 85 YAW 119, minus 119.

CAPCOM That's a good read back, John, except the NOUN
61, the latitude is .71. Minus .71.

SC Okay. .71.

END OF TAPE

SC Okay. .71.

PAO This is Apollo Control, Houston, at 285 hours 46 minutes ground elapsed time. You heard John Young aboard Apollo 16 responding to the midcourse maneuver number 7 pad which was just passed up to him by Capcom Hank Hartsfield. MCC-7 is scheduled for ignition at 287 hours 23 minutes 27 - or 26 seconds ground elapsed time with a Delta V of 1.4 feet per second, a burn duration of 4 seconds.

CAPCOM Apollo 16, Houston. We want you to turn the data system off down on panel 230.

SC Okay.

PAO The reason Mission Control has decided to pass along such a small midcourse correction 7 burn is to target the service module -

SC - - torque versus course aline for the REFSMMAT change.

CAPCOM Negative, Ken. But I'll check it.

SC Okay. That's in light of these funnies. I'd hate to have it end up losing all track of what it's doing.

CAPCOM Roger.

PAO The reason for such a small midcourse 7 burn is to target the service module away from an island in the landing footprint. Also this will further fine tune the entry angle. Because we feel assured of - we feel assured of doing this because of an ability to realine the platform. This capability exists even if we did have a recurrence of the program alarm, which we saw earlier this morning. We now show Apollo 16 at a distance of 35 296 nautical miles away from the Earth and traveling at a speed of 10 425 feet per second.

CAPCOM Apollo 16, Houston. Normal procedures on the P52 course aline.

SC Okay. Thank you, sir.

CAPCOM Apollo 16, on the alpha -

PAO This is Apollo Control, Houston, at 285 hours 53 minutes ground elapsed time. Based on that midcourse correction number 7 pad we have the following times to pass along. Time of entry into the Earth's atmosphere, 290 hours 23 minutes 32 seconds ground elapsed time, retro elapsed time to 05 g, 27 seconds, retro elapsed time to begin blackout, 16 seconds, retro elapsed time to end blackout, 3 minutes 33 seconds, retro elapsed time to time of drogue chute deployment, 7 minutes 43 seconds, retro elapsed time to time of main chute deployment, 8 minutes 29 seconds and retro elapsed to splash 13 minutes 21 seconds.

PAO We also indicate a max g load on the crew of Apollo 16 with this entry path at 6.87 g's.

CAPCOM Apollo 16, Houston. We have a entry pad for you.

SC Okay. Just a second, Henry.

END OF TAPE

PAO This is Apollo Control, Houston, at 285 hours 57 minutes ground elapsed time. The name of the island which initially would have been in the footprint of the service module had we had not chosen to do mid-course correction 7, is Penrhyn, it was B29 base during World-War II. There's some 500 to 600 inhabitants on the island and it's chief export is pearl shell. We're at 285 hours 58 minutes ground elapsed time. We now show Apollo 16 at a distance of 34346 nautical miles away from the earth and traveling at a speed of 10568 feet per second.

SC Start torque.

CAPCOM And 16, we're still standby on that entry PAD.

SC Okay.

CAPCOM And 16, after we get this PAD up, Stu is going to have some words for you about the checklist change.

SC Okay. Go ahead with the PAD.

CAPCOM Okay, mid-pad 000 153 000, 290 06 32, 267 minus 00.71 minus 156.18, 069 36 196, 650 10458 36 276, 290 23 32 0027, NOUN 69 is NA, 400 0202 0016, 0333 0743, sextant star, 25, 151.5, 26.2, foresight NA, lift vector up, use non-exit EMS pattern, RET for 90 EK, 06 06. RET mags, 0829, RET landing, 1321, constant G entry, roll right, moon set, 290 20 26, EMS entry, reverse (garble) at 20 000 feet per second.

SC Okay, mid-pack roll 0, pitch 153, yaw 0, 290 06 32, 267 minus 00.71 minus 156.18, 0.69 -- 06.9 plus 36 196 minus 006.5 plus 10458 plus 36 276, 290 23 32, 0027 NA on NOUN 69, D zero 4.00, B insert time, 202, 0016, 0333 0743, 25, 151.5, 26.2, NA, lift vector up, nonexit EMS pattern, RET 90 K, 06 plus 06, main 08 plus 29, landing, 13 plus 21, constant G entry, roll right, moon set, 290 20 26, EMS entry, reverse back at 20 K feet per second.

CAPCOM Good readback, John.

END OF TAPE

PAO Apollo Control Houston at 286 hours 6 minutes ground elapsed time. Apollo 16, now 33 550 nautical miles away from the earth, and now traveling at a velocity of 10 693 feet per second. You heard John Young taking down the entry pad as passed up by CapCom Hank Hartsfield. We repeat again the numbers. We expect in ground elapsed time, Apollo 16 to reenter the earths atmosphere at 290 hours 23 minutes 32 seconds. The black-out period will begin at plus 16 seconds from entry interface. The blackout period will end at 3 minutes 33 seconds from time of entry interface, main drogue chute deployment 7 minutes 43 seconds from time of entry interface. Main chute deployment 8 minutes 29 seconds from time of entry interface, and splashdown predicted at 13 minutes 21 seconds from time of entry interface. The velocity at time of entry into the earths atmosphere of 36 276 feet per second. We expect the crew of Apollo 16 to pull a max G load of 6.87. We're at 286 hours 7 minutes ground elapsed time and this is Apollo Control Houston.

CAPCOM 16, Houston.

SC Good morning Stuart.

CAPCOM Oh, jolly good there. I've got a couple or 3 changes to your checklist and your cue card if you want to fish those out.

SC Okay, got the cue card and an entry checklist.

CAPCOM Okay, let's go to the entry checklist, page G 1-2.

SC Okay, G 1-2. You're starting early in the book.

CAPCOM Oh, Roger. Okay, lets go down here to - at the end of the logic sequence check.

SC Okay.

CAPCOM Right after we've opened the SEP circuit breakers there, we want to write in, battery compartment pressure check - systems test 7A. If offscale high open vent valve through entry.

SC Okay, battery compartment pressure check that's meter 7A, if offscale high open through entry, and just for your information, right now it's at 2.9.

CAPCOM Okay, copy. Okay, and then at the bottom of that page, after the P52, put in - I'm sorry - let's do it before the P52, add start EMP 509. And this is just an arbitrary point that we've - that we picked Ken. We're getting close enough now that we think we ought to have 509 running. We would prefer you to go

CAPCOM ahead and do the P52 in SCS, as you have been doing, but let's just have 509 running before you go into that P52.

SC Okay, that's fair.

CAPCOM Okay, let's go over to 1-3 and -

SC Alright.

CAPCOM Down under the bore sight, this is the standard bit, delete your verb 41 noun 91 and add verb 16 noun 91 enter, use manual optics.

SC Okay, manual on the bore sight.

CAPCOM Okay, and now, after you drive the optics to 90 degrees, we want to delete the optics power OFF, and we want to verify optics speed LOW. And we're going to leave the optics power on and here in the mysterious world of glitches, this is going to minimize the probability, so we're going to come in with it on and we'll put the speed to low just to hold down the drift.

SC Okay, after the 90 degree shaft, why we'll delete optics power off and verify that the speed is low.

CAPCOM Okay, now let's go to 2-2. Thank you, I need to be looking at this instead of that.

SC Okay, 2-2.

CAPCOM Okay, now, after we get down to - after the P61 entry prep and prior to entering P61 we want to add - and what we're doing here Ken, is we're resetting the average G flag, which we set in 509 and if we do not do this step, now this is a pretty critical step, if we do not reset that average G flag, P61 will not call average G. So our procedure here before we go into P61 is a verb 25, noun 7 ENTER 75 ENTER 1 ENTER ENTER and if for some reason P61 would not call up average G, your fastest and most obvious cue is that lack of the comp cycle before noun 61 comes up. If you don't reset this, your noun 61 comes up immediately, but with 509 running, we got to get this step in or we'll not pick up our average G.

END OF TAPE

SC Okay. That's a good one to know.
CAPCOM Rog. And now about just reading that
step back to me.
SC Okay. Before calling P61, I'm going to
reset the average g flag with a VERB 25 NOUN 7, 75 enter,
1 enter and 0 enter. And I'll do that prior to calling P61.
CAPCOM Okay. Jolly good. And let's go over to
2-4.
SC Okay. 2-4.
CAPCOM Okay. And what we're doing here now is
after you've pro and you activate the entry DAP, at that time
your NOUN 46 first digit is dropped to a zero. To reactivate
MP509, after the flashing 0661 comes up, let's insert in there
a VERB 21 NOUN 46 enter 30 000 enter. And of course, all we're
doing here is putting the 3 back in NOUN 46 and this was dropped
as I said when you went into the entry DAP.
SC Okay. Now you want to do that after line
13 or before that?
CAPCOM Okay. After line 13, in between the
flashing 0661 and before the pro.
CAPCOM It's really not. I just think they wanted
to get it back in as soon as they can. Just before you do
anything else.
SC Okay. Stu, after flashing 61 and before
proceeding on that, we'll do a VERB 21 NOUN 46 30 000 enter.
CAPCOM Rog. You'll do a VERB 21 NOUN 36 enter
30 000 enter.
SC That's right.
CAPCOM Okay. And you got the picture of why we're
having to do that.
SC Yes, sir.
CAPCOM Okay. Now the - now if you'll pick up your
cue card we'll change it to the same things that we've just
gone over in the checklist here.
SC Okay.
CAPCOM Okay. Prior to your P61, add VERB 25
NOUN 7 enter, 75 enter, 1 enter, zero enter.
SC Okay. I'll reset that flag before P61.
CAPCOM Okay. And back down here in your P62 box,
same thing we just talked about. Prior to the pro after the
0661 add VERB 21 NOUN 46 enter, 30 000 enter.
SC Okay. Got that.
CAPCOM Okay. And got a change here to your systems
checklist and this is just changing to reflect the increased
pressure in the battery compartment. If you'd like to change
that, it's page S1-2 under step 3.
CAPCOM Where's that systems checklist.
SC Hold it.
CAPCOM 1-2.

SC Okay.

CAPCOM Okay. Down toward the bottom of the page, about 3 lines up, we've got a comment in there, if greater than 1.5 battery vent valve, vent. We want to change that 1.5 to 3.4.

SC Okay. We change that to 3.4.

CAPCOM Okay. It's a pretty innocuous change. And the line right above that too. Systems test 7A, battery compartment pressure less than 1.5, change that to 3.4 also.

SC Okay.

CAPCOM Okay. Those are the changes, Ken. And we're working up a list here. It'll be pretty straightforward. I don't want to give them to you now. We're messageing them - of the cues that will indicate to you these CDU glitches just prior to and during the entry phase and I'd like to talk to you about that in a little bit when we get all squared away.

SC Okay. Thank you.

CAPCOM Rog.

CAPCOM Oh, I'd like to also add here, Ken, and - -

END OF TAPE

CAPCOM I would like to also add here, Ken, and of course, as you well know, this mysterious glitch solutions -- we got to shotgun it and we're trying to try the areas that are a prime candidate for glitching the CDU and one of these is during your GDC aline procedure, when you have your ACCEPT switch to ACCEPT and you either switch into or out of IMU on the source. What you're doing here is loading up the CDU's and they feel that this is a prime candidate for a glitch. So, our words of wisdom are to minimize the number of times that you use this switch, and I guess after your GDC aline in the normal checklist, we kind of like to see you not cycle that source switch to IMU with your ACCEPT switch and ACCEPT. I guess you could still check your GDC versus NOUN 20's if you wanted to, but I did want you to be aware of this particular switch combination as loading up the CDU's and this where we have the probability of glitches.

SC Okay, thank you.

CAPCOM And just --

SC As you know, we've only alined the GDC and IMU a thousand times, and I don't think that had any thing to do with the glitch we've had so far.

CAPCOM Yeah, we realize that, John. The problem is we don't know what's causing the glitch. We just -- at this time, we can't say.

SC That's true, but I'm saying that -- oh, never mind.

PAO This is Apollo Control, Houston, at 286 hours 23 minutes ground elapsed time. Apollo 16 now 31829 nautical miles away from the earth. The velocity now reads 10978 feet per second. We've heard Stu Roosa talking from the Capcom's console. Stu Roosa, the backup command module pilot for Apcllo 16. Meanwhile, the weather forecast for the planned landing area located about 1200 miles south of Hawaii calls for scattered clouds, cloud coverage 2000 feet scattered, easterly winds, 10 knots, 3 foot seas, visibility at 10 nautical miles and temperature near 82 degrees. Our current predicted splash coordinants based on mid-course correction 7 and our entry angle 44 minutes south, 156 degrees, 11 minutes west. We're at 286 hours 24 minutes ground elapsed time, this is Apollo Control, Houston.

SC Houston, 16.

CAPCOM Go ahead.

SC You folks have any objections if we pump up the cabin to about 57 now so we can full packages and have a little PAD on the camera pressure? The rates are running a little low.

APOLLO 16 MISSION COMMENTARY 4/27/72 CST 9:28 GET 286:21 914/2

CAPCOM
SC

Okay. Go ahead, Ken.
Thank you.

END OF TAPE

PAO Apollo Control Houston. 286 hours 43 minutes ground elapsed time. We're now some 40 minutes from time of ignition for midcourse burn number 7. This is scheduled to occur at 287 hours 23 minutes 27 - 26 seconds ground elapsed time. A very small maneuver with a Delta V of 1.4 feet per second, and burn duration of 4 seconds. We now show Apollo 16 at 29,686 nautical miles away from the earth, and traveling at a speed of 11,359 feet per second. This is Apollo Control Houston.

CAPCOM Ken, it all looks good down here. We don't think you need the VERB 40.

SC Okay. I agree. Sure gets your attention though.

CAPCOM Roger.

CAPCOM Wait a couple of hours, Ken, and it'll even get you attention faster, and when all of you've got a chance to listen, I've got a couple of words on the, on the CDU transient cue's.

SC Okay. Why don't you wait a few minutes. We're still clean up a little stowage here.

CAPCOM Okay.

SC Well, there we go again.

CAPCOM Roger, we see it.

PAO This is Apollo Control Houston. 286 hours 59 minutes ground elapsed time. We've seen a recurrence of the program alarm light. That was the reference just made. The light is out now reports guidance. We're at 287 hours -

SC Got it out that time, by kicking the panel. Sounds to me like the switch, it sounds to me like some kind of contamination in the, in the switch.

CAPCOM Where did -

SC Another relay or whatever.

CAPCOM Where did you kick, John.

SC I kicked right, I put my - when it went out, I was kicking right over the NOUN 99 codes and just below that.

SC I think that was LEB -

SC Yea, I think I was -

SC kicking on the region, what's just below there. The PSA with the modules in it?

CAPCOM I, maybe there was something through that tool E hitting it awhile ago.

SC Could have been. Or maybe it just went out.

PAO That was John Young reporting on his remedy for putting the light out. The Apollo 16 is returned to it's primary guidance and navigation system. And systems look good here in the Mission Control at this time. We show Apollo 16 at a distance of 27,779 nautical miles away from the earth, and traveling at a speed of 11,725 feet per second. We're at 287 hours 1 minute ground elapsed time. This is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control, Houston, at 287 hours 10 minutes ground elapsed time. Apollo 16 now 13 minutes away from time of ignition for midcourse correction number 4. The onboard computer is now in program 41. This is the reaction control system program which provides a computation for a preferred platform orientation and preferred vehicle attitude for the thrusting maneuver, and the maneuvers the vehicle to the proper thrusting attitude. We now show Apollo 16 at a distance of 26749 nautical miles away from the earth and with the velocity of 11939 feet per second. 287 hours 11 minutes ground elapsed time, this is Apollo Control, Houston.

CAPCOM Apollo 16, Houston. We'd like to verify the S-band off TV switch off.

SC You're on it.

SC Okay, it's verified off now.

CAPCOM Okay, thank you.

PAO This is Apollo Control, Houston, at 287 hours 18 minutes ground elapsed time. Flight Director --

CAPCOM Go for midcourse time?

SC Roger. Go for 7.

PAO Flight Director Phil Shaffer having taken a go/no-go for midcourse 7 passed it along the Capcom Henry Hartsfield, who in turn, passed it along to the crew. We're 4 minutes 9 seconds away from time of ignition and we show Apollo 16 at a distance of 25815 nautical miles away from the earth and traveling at a speed of 12143 feet per second.

PAO Apollo Control, Houston. 2 minutes away now from time of ignition for midcourse correction 7.

CAPCOM Apollo 16, press your key release.

SC It'll clear up at (garble).

SC Okay, the burn's complete. Residual is plus 110 minus 0 plus 1 or plus -- yeah.

CAPCOM Roge, copy.

PAO This is Apollo Control, Houston, at 287 hours 24 minutes ground elapsed time. You heard John Young report that the midcourse correction 7 burn has been completed. We copied time of ignition at 24 seconds beyond the scheduled time.

END OF TAPE

PAO - - this a very minimal burn providing a Delta V of 1.4 feet per second.

PAO Apollo Control, Houston, 287 hours 25 minutes ground elapsed time.

SC Need photo attitude.

CAPCOM Roger.

PAO Apollo 16 now being maneuvered to the ultraviolet photography attitude. The fact that the burn occurred at 24 seconds beyond the scheduled time will have no effect on the entry corridor. We're at 287 hours 26 minutes ground elapsed time. We show Apollo 16 at a distance of 25 048 nautical miles away from the Earth travelling at a velocity of 12 316 feet per second. This is Apollo Control, Houston.

CAPCOM Apollo 16, OMNI Delta.

CAPCOM 16, Houston.

SC Hello there.

CAPCOM Rog. Just a little info. We're going to be - we'll give you a call but we'll be bringing the batteries on at EI minus 45, about 15 minutes early, just so we'll have a little extra time to take a look at them.

SC Okay.

PAO This is Apollo Control, Houston, at 287 hours 32 minutes ground elapsed time. We now show Apollo 16 at a distance of 24 294 nautical miles out from the Earth and travelling at a velocity of 12 495 feet per second. The 24-second delayed ignition time on midcourse correction number 7 will have no effect on the entry corridor. Rather Ken Mattingly had not finished sequencing out his program for the burn, this program number 41 on the computer. The RCS systems. And Flight Dynamics reports, based on his present trajectory plotting, an entry angle of minus 6.48 degrees. We're at 287 hours 33 minutes ground elapsed time, this is Apollo Control, Houston.

SC Houston, we've got the UV camera all set up. It looks like we're pointing at the Earth. How about if we go ahead and take this - give you sequence now instead of waiting until 5 by.

CAPCOM Stand by. Ken, you can go ahead with the photos.

SC Okay. Thank you.

SC Houston, we're going around the closeout panels and we're down here around 382 and are you happy with the mixing valve position or are you going to want to change it before we close it up?

CAPCOM I'll get you an answer on that, Ken.

END OF TAPE

CAPCOM Locks like a good setting, Ken.
SC Okay, we're going to close out the panel.
SC Houston, you going to give us another entry
pad after you work this Mmid-course for awhile aren't you?
CAPCOM That's probably about -- it'll be another
hour and 20 mintes.
SC Okay.
CAPCOM And for planned purposes, we're going to
be bringing -- we'd like to bring the batteries on a little
earlier but we'll give you a cue on that. We just want to
look at it since we had this venting problem.
SC Roger.
SC The battery pad is up to almost 3 now.
299.
CAPCOM Roger.
PAO This is Apollo Control, Houston, at 287 hours
59 minutes ground elapsed time. Apollo 16 now 21203 nautical
miles away from the earth and now traveling at a speed of
13314 feet per second. We'll continue to monitor the air-ground
for any conversations that develop between our Capcom console manned
by Henry Hartsfield along with backup command module pilot
Stu Roosa and the crew of Apollo 16. At 287 hours 59 minutes
ground elapsed time, this is Apollo Control, Houston.
SC Hank, we got the earth at our window 5.
It's very impressive the subsolar pint is toward us. Specularly bright
CAPCOM Sounds great.
SC It looks great, I'll tell you.
CAPCOM We show you that little away about 20700 miles
out now and about 13400 feet per second.
SC You're starting to haul it in.
SC Houston, 16. We're ready for the logic
check whenever you are.
CAPCOM Standby, Ken, we'll get a check point here.
SC Okay.
CAPCOM Okay, 16. Go ahead with the logic check.
SC Okay. The logic is coming on. Number 1,
armed, number 2. The two logics are on.
CAPCOM Roger.
CAPCOM Your go for power arm as required.
SC Temperature.
SC Okay, let's do that check again.
CAPCOM I understand you'd like to repeat.
SC Yes, please. Okay, now. The sixth logic
is coming on now.
CAPCOM It still looks good, 16.
SC Okay. Thank you. Thank you now.

END OF TAPE

CAPCOM Apollo 16, Houston. We saw a C&W about the time you started the logic check. Were you testing the lights or did you really get a warning there?

SC We were doing a light test.

CAPCOM Roger. Copy.

SC Okay, Houston. The battery compartment is reading about 3 so according to the rules, we do not go to vent.

CAPCOM Roger. That's - we concur.

SC Okay, Houston. We have EMD 509 loaded.

CAPCOM Roger. Copy.

SC And we're going to hold onto P52 until we get down to the nominal time.

CAPCOM Roger.

CAPCOM Apollo 16, Houston.

SC Go ahead. Over.

CAPCOM Okay. I don't know how you're coming along in your time line there. I would like to make a couple of comments if you've got time to listen. I don't think you want to copy anything at this point.

SC Okay. Looks like we're between - just before doing the P52. Go ahead, Stu.

CAPCOM Okay. This deals with our favorite problem of course, the - your ISS warning and right now you people are doing all the right things and we're wanting to do those same procedures right through - right through entry when, of course, when ISS comes on, I'm sure you're going to go to spacecraft control which you've been doing and you've been checking that alarm code and we're saying that if you have that 3 triple 7, to ignore it. Whether it needs it or not just to keep the procedure straightforward, we - after you - while you're still in SCS do a VERB 40 enter and wait your ten seconds and go back to CMC. So this means that we're saying - well, come all the way in CMC with that 3 triple 7 alarm showing. If you do get a - if you do have a CDU failure, why, you will see it in your bank angle - your - just your normal procedures there where you're looking at your commanded DSKY angle versus what the spacecraft is doing. Also if you have got a glitch in the CDU such as we got on the way out, and it's not the 90 degree bit, of course, if the 90 degree bit is set you'll have the gimbal lock telling you that. And it's again the same old bit, SCS VERB 40, wait 10 seconds, back to CMC. You can get some glitches of course in the CDU's that are not the 90 degree bit. I mean there's a possibility of it. And just some words on that - if - if the - if it's a low angle bit set, say less than 30 degrees, you - it really does not effect your target point. I mean we're talking in the order of being very close to nominal, within a mile or so. If the bit set is large enough for you to see it, comparing

CAPCOM the - I mean if the bit set if going to effect your splashdown point by any appreciable amount, you'll see it comparing your command at angle versus where the spacecraft is going. So that's your clue. And if you see this and it's not looking right, we want you to go to SCS, do a VERB 40 and back to CMC and see if that solves the problem.

SC Okay. That all sounds reasonable.

CAPCOM Okay. And I guess the - I guess this - about the only thing I'm saying it can depreciable difference is this VERB 40. I'm not used to doing that during the entry and I'd like to emphasize that if it's looking funny and you're not sure, well go ahead and do it. And of course, as you well know, the needles will zero and the DAP will be on for 10 seconds and you'll be back in business. There's one other point and I'll admit this is stretching pretty thin, but we're trying to cover all the angles. If it's prior to P64, where you're going along - of course, if you're in CMC control and you get a glitch why get the response from the DAP. If you're going along in SCS control and you get a glitch why you're needles will go out. Now you may have your pitch needle already pegged. So there's - here again, we might have a glitch and that pitch needle - you're in the pitch CDU and not know it. So just one other recommendation is if your pitch needle doesn't come off the peg the way you like it, why let's try a VERB 40 before we would say the G&N is not doing correctly.

SC Okay.

CAPCOM And I guess that about takes care of it, Ken, John, unless you got any - Charlie, unless you got any questions, it'd probably be John punching up the alarm there and if you do get the 3777 while let's reset it and press ahead and, of course, any of the other triple 7 alarms are valid, but of course, it's the same old monitoring bit. You're going to see how she goes.

END OF TAPE

SC Okay, Stu, I think that's all pretty well understood, thank you very much.

CAPCOM Roger.

SC Yes, Stu, we appreciate it.

CAPCOM Okay.

SC You've been spending a lot of time learning about CDUs, I expect, huh?

CAPCOM Hey, that's a favorite topic of discussion, now, CDUs and how do they glitch.

PAO Apollo Control Houston at 288:19 minutes ground elapsed time. That was backup command module pilot -

SC Going to get another entry pad.

CAPCOM That's affirmative, about an hour from now.

PAO That was backup Command Module Pilot Stu Roosa talking to the crew of Apollo 16 going over procedures that they may desire to follow if they do see some irregularities in their guidance and navigation system in the final phases of entry. We now show Apollo 16 at an altitude of 18 635 nautical miles away from the earth and traveling at a velocity of 14 113 feet per second. We show 2 hours 4 minutes away from time of entry, and at 288 hours 20 minutes ground elapsed time this is Apollo Control Houston.

CAPCOM Apollo 16, our first batch of tracking data shows you right in the groove and we're going to get another hours worth of data and then give you your final pad.

SC Roger.

SC Okay, Houston, the EMS checks in stand by. Its pattern checked out okay.

CAPCOM Roger, copy.

END OF TAPE

PAO This is Apollo Control Houston, at 288 hours 31 minutes ground elapsed time. We now show Apollo 16 at a distance of 17,057 nautical miles away from the earth. Velocity now reading 14,667 feet per second. The flight dynamics officer here at Mission Control is reported to flight director Phil Shaffer after reviewing a second set of tracking data that our entry angle is still holding very firm and solid. He reports an entry angle of minus 6.53. We're at 288 hours 32 minutes ground elapsed time, and this is Apollo Control Houston.

SC Houston, we're going to maneuver to the entry attitude.

CAPCOM Roger.

SC Do you happen to have 2 stars to recommend to us. We got a 405 here.

CAPCOM Roger, we saw it, and FAL is working on it.

CAPCOM Ken, your current attitude is good for stars 15 and 21.

SC Thank you very much, Roger.

PAO This is Apollo Control Houston at 288 hours 50 minutes ground elapsed time. The 405 referred to was a, an indication that 2 stars were not available for the guidance and navigation system. The crew of Apollo 16 now in program 62 doing a final alinement to their platform prior to entry. We now show Apollo 16 at a distance of 14 491 nautical miles away from the earth, and traveling at a velocity of 15 744 feet per second.

SC Plans a good platform isn't it.

CAPCOM That's a beauty.

SC And when you have the numbers, we'll torque.

CAPCOM Clear to torque.

SC Okay, we're going to the horizon attitude check, Houston.

CAPCOM Roger, copy.

END OF TAPE

CAPCOM Apollo 16, OMNI CHARLIE.

SC Roger, you have it.

CAPCOM Roger.

SC Okay, Hank, we're into the checklist
down to standing by for the glycol loop of evaporator
activations.

CAPCOM Roger, copy.

PAO This is Apollo Control Houston at
289 hours and 3 minutes ground elapsed time. That was
Lunar Module Pilot Charles Duke reporting that the crew
of Apollo 16 proceeding now well into their entry check
lost. We show Apollo 16 now at a distance of 12 676 nauti-
cal miles away from the earth and now traveling at a speed
of 16 631 feet per second. Our countdown clock in Mission
Control shows 1 hour 20 minutes remaining until time of
entry into the Earths atmosphere. At 289 hours 4 minutes
ground elapsed time this is Apollo Control Houston.

SC Houston, the evaporators are up.

CAPCOM Roger, copy.

SC Hank, is - are we okay with the tip end
valve in manual with this setting?

CAPCOM That's affirmative.

SC Okay.

PAO This is Apollo Control Houston at
289 hours 14 minutes ground elapsed time. We now show
1 hour 9 minutes 50 seconds till time of entry into the earths
atmosphere. Meanwhile the weather around the prime re-
covery vessel, the Aircraft Carrier Ticonderoga, is good.
Our displays here show a cloud cover of 2000 feet scattered,
visibility 10 nautical miles, wind direction coming from
90 degrees at a velocity of 10 miles per hour, wave heights
3 feet. And in the area, 4 helicopters and 2 HC130 rescue
aircraft will be airborne at time of splash. The heli-
copters will be hovering within 3 to 5 miles of the track
and the target area and the HC130's carrying pararescue
swimmers 100 nautical miles north of track. The 2 most
likely airborne crews to be involved in the pickup of
the astronauts are those aboard the rescue HELO, and the
swim helicopter. The primary recovery helicopter crews
lists as follows, Commander A.K. Phizer is the Aircraft
commander, his hometown is Peru, Illinois, his co-pilot is
Lieutenant J.G., Jon Gregory, Jon is J O N, his hometown
is Oakland, California, the first crewman is Chief Aviation
Machinest Mate, George Sellers, of Monroe, Louisiana, the
second crewman Aviation Metal Smith, Gary Gentry of Berryville
Arkansas. The swim personal aboard the first to jump

PAO Lieutenant Earl Kachita, his hometown, Stalackholm, Washington, the second to jump, Chief Enginmen Gary Phelps, of Cloverdale, California, the third to jump Radio Man first class Charles McGee, of Charlestown, South Carolina. Aboard the swim helicopter the helicopter carrying the swimmers who will be involved if the primary recovery helicopter does not reach the location first, include Aircraft Commander Lieutenant Dave Nakamoto, hometown Honolulu, Hawaii, and the co-pilot is Lieutenant Commander Paul Vasquez, of Hazard, Kentucky, first crewman Aviation Metal Smith third class, Ron Bertoletti, of Alton, Illinois, and the second crewman Aviation Electronics Technition second class Frank Hueber, of Evert, Washington. The swimmers include, first to jump, Warrant Officer, Jerry Hammerly,

CAPCOM We'll send you a state vector and Z triple bias update.

SC Okay, you have it.

PAO The second to jump in the event the swim helicopter is used, Electronics Technician Third class Michael Gotchi, of Denver, Colorado, and the third to jump Personnel man third class Bill Ranger, of Holyoake, Massachusettes. We're now at 289 hours 18 minutes ground elapsed time. Apollo 16 now 10,535 nautical miles away from the Earth. Traveling at a speed of 17,927 feet per second and this is Apollo Control, Houston.

END OF TAPE

CAPCOM Apollo 16, the computers yours. And I've got your recovery information. The weathers good. 2 thousand foot scattered 10 miles. The winds out of the east at 10 knots, 3 feet wave height. The recovery ship is Ticonderoga, and the aircraft is Recovery.

SC Roger, understand. Thank you very much.

SC Houston, the power battery check is okay.

CAPCOM Roger, copy.

SC Houston, we're ready for the VHF check, over.

CAPCOM Roger, John. We're going to have to wait a few minutes here to be, until we get in a little closer.

SC Okay. We're going to do the command module RCS activation, if that's okay.

CAPCOM Standby one.

CAPCOM Okay, go ahead.

SC Roger.

SC Okay, here comes the logic on Houston.

CAPCOM Roger.

CAPCOM Standby, John. It will be a minute before we get data. 16, Houston, would you take the logics off please, and then back on again.

SC Okay, their going off, and back on. Their off now. Their on now. 1 is, 2 is.

CAPCOM Apollo 16, your go for power arm.

SC Rger. Okay, power arm A is armed and B is armed.

CAPCOM Looks good.

SC Okay, we're pressurizing her now, Houston.

PAO This is Apollo Control Houston, at 289 hours 27 minutes ground elapsed time. We presently show Apollo 16 at a distance of 9,020 nautical miles away from the earth.

SC Right here.

CAPCOM There you go.

PAO Velocity beginning to build up now quite rapidly, now reading 19 024 feet per second. Meanwhile our retro fire office here in Mission Control is doing his final requirements for the entry pad which will be passed up to the crew of Apollo 16. The times are holding quite close to the earlier plan, however, we will pass these times along as they are now reflected. Time of entry into the Earth's atmosphere 290 hours 23 minutes 31 seconds. Time of 05 G and retroelapsed time 27 seconds, retroelapsed time for begin blackout 16 seconds. Time for end of blackout and retr elapsed time 3 minutes 31 seconds. Retroelapsed time for drogue chute deployment 7 minutes 46 seconds. Retroelapsed time for main chute deployment 8 minutes 32 seconds. Retroelapsed time for spacecraft splashdown 13 minutes and 24 seconds. We show a velocity at time of entry into the Earth's atmosphere for Apollo 16 at 36 276 feet per second. This is predicted. And a max G on the crew of Apollo 16 during entry of 7.07 Gs. We're

APOLLO 16 MISSION COMMENTARY 4/27/72 CST 12:28 GET 289:20 923/2

PAO at 289 hours 29 minutes. We now show Apollo 16 at a distance of 8734 nautical miles away from the Earth and traveling now at a speed of 18 254 feet per second. Our countdown clock shows 54 minutes until time of entry and this is Apollo Control Houston.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/27/72 CST 12:38 GET 289:30 MC924/1

CAPCOM Apollo 16, Houston. If you'll bring up your VHF simplex A we'll do a voice check with you about 5 minutes after we configure the ground.

SC It's up, Henry.

CAPCOM Okay.

CAPCOM Apollo 16, Houston. I have your final entry pad.

SC Go ahead, Hank.

CAPCOM Roger, midpack 000 153 000 290 06 31 267 minus 0071 minus 15618 071 36196 654 10510 36276 290 23 31 05G 0027 NOUN 69 NA DO 400 0200 0016 0331 0746 boresight sextant stars NA left vector up and there's only one change in the comments, Charlie. The RET for 90K do you want me to read all those?

SC Just give me the RET.

CAPCOM Okay, RET 90K is 60A.

SC Okay, the main is the same.

CAPCOM Roger, the other times and the other comments remain the same.

SC Okay, with the readback, Hank. Midpack 000 153000 290 0631 267 minus 0071 minus 15618 071 36 196 654 10510 36276 290 23 31 0027 NOUN 69 is NA. 400 02 00 0016 0331 0746 sextant and boresight are NA left vector is up. All the comments are the same except RET 90K is 6 plus 08 over.

CAPCOM Good readback, John.

PAO This is Apollo control Houston at 289 hours 37 minutes ground elapsed time. We now show Apollo 16 at a distance of 7 466 nautical miles away from the earth now traveling at a velocity of 20 347 feet per second. You heard the entry pad - final entry pad being passed up to the crew of Apollo 16 which reflects in addition to the other numbers we've just passed along the range to go at time of entry interface of 1 051 nautical miles to target point or splash-down point. And an entry angle at 400 000 feet of minus 6.54 degrees. We're at 289 hours 38 minutes ground elapsed time. We're approximately 45 minutes 45 seconds from time of entry and this is Apollo control, Houston.

END OF TAPE

CAPCOM Apollo 16, Houston. We'd like to get the main BUS times on a little early as we talked about.

SC Okay. Okay, their on Henry.

CAPCOM Roger, thank you. They look good.

PAO This is Apollo control, Houston at 289 hours 39 minutes ground elapsed time. That was lunar module pilot Charles Duke reporting that he has turned on the three entry batteries. We had planned to turn those on some 15 minutes ahead of the normal checklist. And they have been checked out and are looking good. We now show Apollo 16 at a distance of 7 068 nautical miles away from the earth and traveling at a velocity of 20 739 feet per second. This is Apollo control, Houston.

CAPCOM Apollo 16, Houston. Like to verify that you have the left VHF antenna.

SC Negative, we had the right we're on left antenna now.

CAPCOM Roger.

PAO Apollo control, Houston at 289 hours 41 minutes ground elapsed time in the mission control center we have switched over to our earth display. We're 42 minutes 45 seconds from time until entry.

CAPCOM Apollo 16, Houston. On VHF, how do you read?

SC A lot clearer, Hank.

CAPCOM Roger, reading you loud but a little noise.

SC Okay, we're checking out the command module thrusters now.

CAPCOM Roger. We're ready to go John.

SC Okay.

PAO This is Apollo control, Houston at 289 hours 43 minutes ground elapsed time. The crew of Apollo 16 now going through their final procedures prior to entry checking out presently the reaction control system aboard the spacecraft. We show 40 minutes now from time from entry into the earths atmosphere.

SC We confirm we got allage.

CAPCOM Apollo 16, Houston we got ...

END OF TAPE

SC Okay.
SC Do you want us to go to ACCEPT now?
CAPCOM Negative.
PAO This is Apollo Control Houston at 289 hours 52 minutes of ground elapsed time. Our last demand space flight network station prior to handover to the Apollo ranging and instrumentation aircraft is Honeysuckle. This handover will take place at 290 hours 14 minutes 32 seconds ground elapsed time, or approximately 9 minutes before time of entry into the Earth's atmosphere. The Apollo instrumentation and ranging aircraft, this is a modified C 135, will provide the Mission Control Center in Houston not only voice coverage with the crew of Apollo 16, but will also provide telemetry data.
CAPCOM -- set up that (garble)
SC You have it.
CAPCOM It appears that (garble) responding the temperature changes, is what the problem is John.
SC Okay.
CAPCOM Apollo 16, the computer's yours.
SC Okay, go to block.
PAO This is Apollo Control at Houston at 289 hours 56 minutes of ground elapsed time. We're some 27 minutes of --
SC -- the deadband cooperated?
CAPCOM That's affirmative.
SC Okay, we're going to block.
PAO We're 27 minutes now away from time of entry. And flight director Bill Shaffer now taking a final status check with his mission control team as Apollo 16 is returning to the Earth's atmosphere.
PAO Apollo Control Houston, the recovery's staff support room here in Mission Control reports beautiful weather in the recovery area. The helicopters are airborne, but not yet on station.
SC Turnin' off -- I'm turnin' off the fuel pumps now.
CAPCOM Roger.
PAO This is Apollo Control Houston at 289 hours 58 minutes of ground elapsed time, a little more than 25 minutes now away from time of entry into the Earth's atmosphere. The Service Module will be separated from Apollo 16 at approximately 15 minutes prior to entry into the Earth's atmosphere. For this activity, the spacecraft yaw's 45 degrees out of plane, the Service Module is fired away at this time to keep it out of the path of Young, Duke, and Mattingly traveling back to Earth in the Command Module. We're at 289 hours 59 minutes ground elapsed time. This is Apollo Control Houston.
SC Okay, we have knocked down the average G

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SC flight.

CAPCOM Roger.

PAO This is Apollo Control Houston 290 hours
1 minute ground elapsed time. The retro valves here in the
Mission Control reports that Apollo 16 is right on track. We
show 22 minutes 20 seconds until time of entry into Earth's
atmosphere.

END OF TAPE

PAO This is Apollo Control, Houston, 290 hours 2 minutes ground elapsed time. The crew of Apollo 16 has now their onboard computer and it's entry preparation program, this for displaying predicted entry data to the crew.

PAO This is Apollo Control, Houston, 290 hours 3 minutes ground elapsed time the onboard display and program 61 indicates a max G of some 7 degrees for Apollo 16. And an entry angle of 6.68 based on the onboard computer.

CAPCOM Your looking good coming up on 7.

PAO Apollo Control, Houston, at 290 hours 4 minutes elapsed time. The onboard computer now displays a maneuver to entry attitude program. It is a guidance and navigation program through which Apollo 16 disposes of the service module and rights itself for entry. The spacecraft will YAW 45 degrees out of plane and the guidance officer here in mission control reports that that YAW maneuver has commenced.

PAO This is Apollo Control, Houston. We show 18 minutes 20 seconds now for the time of entry into the Earths atmosphere. The Apollo 16 spacecraft maneuvering in a YAW maneuver for a service module seperation. Will stand by continue to monitor.

PAO This is Apollo Control, Houston, with 17 minutes away now from time of entry into the Earths atmosphere, the flight dynamics officer at mission control reports an entry angle of minus 6.56 very close to the on-board computation. The pyro aboard the spacecraft are armed in preparation for separating the service module.

SC Okay, we're a minute and a half to CSSM sep.

CAPCOM Roger, copy.

PAO John Young reporting a minute and a half away from service module separation.

PAO This is Apollo Control, Houston, standing by now for service module separation.

SC Separation, Houston.

CAPCOM Roger.

PAO That was the lunar module pilot, Charlie Duke, reporting separation.

CAPCOM Everything looks good from down here 16.

PAO This is Apollo Control, Houston, the service module has separated on time. Casper now travels on entry systems only. Maneuvering now to a proper entry attitude.

SC Okay, Houston, we have the bit 3 set in the 21 46.

CAPCOM Roger, and your looking good.

PAO This is Apollo Control, Houston the

APOLLO 16 MISSION COMMENTARY 4/27/72 CST 1:09 GET 290:01 MC-927/2

PAO crew of Apollo 16 just loading the target
latitude longitude board there onboard computer.

PAO Guidance and control reports the maneuver
back to proper attitude for entry and progressing as programed.

END OF TAPE

PAO Young, Duke, Mattingly now have their computer into the program that provides the prescribed entry into the Earth's atmosphere. The entry equations are in and there will hold -

SC Good.

PAO - and will hold Casper to a correct attitude.

CAPCOM Roger P63.

PAO With this program displayed, we now show the spacecraft at a - traveling at a velocity of 30 912 feet per second and range to go to target, 4 265 nautical miles.

PAO Ten minutes and 30 seconds until time of entry into the Earth's atmosphere, Apollo 16 now traveling at a velocity of 31 405 feet per second, range to go to target 4 085 nautical miles. Mark minus 10 minutes until time that Casper encounters the Earth's atmosphere for the first time in eleven days. We show velocity now reading 31 690 feet per second, range to go to the splash point 3 976 nautical miles.

PAO Apollo Control Houston, Flight Director Phil Shaffer checks again with his team here at Mission Control as to our status; all systems are looking very good at this time. We're nine minutes away now from time of entry to the Earth's atmosphere. Velocity for Apollo 16 32 195 feet per second. Range to go to target 3 784 nautical miles.

PAO Apollo Control Houston, the recovery support room here in Mission Control reports all recovery aircraft are on stand -

SC - another antenna.

CAPCOM Apollo 16, Houston, we're reading you.

SC Looks like your uplink's a little weak, Hank, we're down - we're getting a lot of scratchy

CAPCOM Roger, we're hearing the same thing.

CAPCOM Roger, 16, we're coming through ARIA now.

SC Okay, you sounded pretty good there.

PAO This is Apollo Control, Houston, 7 minutes 30 seconds now to the time of entry. Flight Director Phil Shaffer again checking with his control team as to status. His console coming up all greens; we've had a loss of signal, as far as telemetry data is concerned following this pass over to the Apollo Ranging and Instrumentation Aircraft.

CAPCOM And Apollo 16 Houston, we do not have telemetry.

SC Okay, we're looking good Hank.

CAPCOM Roger.

PAO Apollo Control, Houston 6 minutes now until time of entry into the Earth's atmosphere.

PAO Five minutes, 35 seconds until time of entry. Network reports at Mission Control that neither tracking station at this time can lock onto ARIA telemetry data.

PAO However, we are receiving voice transmissions through the ARIA aircraft.

PAO Mark 5 minutes now until time of entry interphase.

PAO Apollo Control, Houston, minus 4 minutes 23 seconds, we're now receiving ARIA telemetry data through Hawaii. We show Apollo 16 now traveling at a velocity of 34 672 feet per second and range to go to splash -

CAPCOM Got data bank and you're looking good.

SC Roger.

PAO Range to go to splash 2 540 nautical miles.

PAO Apollo Control, Houston, minus 3 minutes 30 seconds now till time of entry into the Earth's atmosphere Apollo 16 now traveling at a speed of 35 043 feet per second, range to go to splash 2 327 nautical miles.

PAO Three minutes now until time of entry into the atmosphere, velocity now reading 35 260 feet per second, range to go 2 170 nautical miles.

PAO Mark, 2 minutes 30 seconds, velocity now 35 450 feet per second, range to go to splash 2 020 nautical miles.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/27/72 CST 1:29 GET 290:21 929/1

PAO Mark. 2 minutes now till time of entry. 16 now travelling at 35 651 feet per second. Arrange to go to splash 1845 nautical miles.

PAO One minute 30 seconds. Apollo now travelling at a velocity of 35 823 feet per second. Range to go to splash 1678 nautical miles.

CAPCOM Apollo 16, you're still looking good.

SC Roger.

PAO Mark. Minus one minute. Velocity now 35967 feet per second. Range to go 1518 nautical miles. 30 seconds now. Velocity 36094 feet per second. Range to go 1357 nautical miles.

PAO Minus 10 seconds. Velocity 36 173 feet per second. Range to go 1270 nautical miles.

PAO We've seen a dropout in our telemetry data indicating Apollo 16 now passing through the Earth's atmosphere.

PAO Apollo Control Houston. We are at 1 minute 5 seconds now since time of entry into the Earth's atmosphere. 1 minutes 10 seconds now. Apollo 16 going through its maximum heat load. This should be 4000 to 4500 degrees Fahrenheit, the maximum temperature on the surface of the heat shield. Mark 1 minute 25 seconds. Apollo 16 now encountering max G, which should be approximately 7 Gs. We're at 1 minute 40 seconds since entry. We show the period of ending blackout a little less than 2 minutes away now.

PAO Two minutes 20 seconds since time of entry in the Earth's atmosphere. The last vector computed by the Flights Dynamics Officer indicated an entry angle of minus 6.55. Almost exactly as predicted.

PAO Apollo Control Houston. The ship Ticonderoga reports a radar contact. We are 3 minutes 30 seconds from time of entry. We should be passing out of the period of communications blackout. We'll standby.

CAPCOM Apollo 16, Houston.

SC Roger. Loud and clear.

CAPCOM Roger. How's it going.

PAO The ship reports the radar contact at 233 miles from the ship. Dated number now 196 nautical miles.

CAPCOM Apollo 16, Houston. We're getting a little data now and everything looks good.

PAO This is Apollo Control Houston. We're now receiving telemetry data through ARIA here in Mission Control. It looks good. For 5 minutes now from time of entry into the Earth's atmosphere.

PAO We're at 5 minutes 35 seconds since entry into the Earth's atmosphere. Still receiving good telemetry data. Predicted time of drogue deployment 7 minutes 46 seconds.

APOLLO 16 MISSION COMMENTARY 4/27/72 CST 1:29 GET 290:21 929/2

PAO Seven minutes now since time of entry into
the Earth's atmosphere. Receiving a intermittent telemetry data
now from the spacecraft onboard computer.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/27/72 290:31GET 1:39CST MC-930/1

PAO -- 8 minutes. EECOM reports the Apex and drogue chutes are out. We now have the first visuals of the spacecraft as the drogue chutes are shown deployed.

CAPCOM Apollo 16, Houston.

PAO These drogue chutes are 16 1/2 feet in diameter. We see the main chutes being deployed now. Visual - The three main chutes, each 83 1/2 feet in diameter, we see 'em blossom.

SC Recovery, this is Apollo 16.

RECOVERY Apollo 16, this is Recovery, welcome back, go ahead!

SC (garble)

RECOVERY This is Recovery, Roger, what is your condition over.

PAO Recovery reports the voice contact with the recovery forces and the crew aboard Apollo 16.

SC Roger.

(garble)

RECOVERY Thank you, this is Recovery, did you receive the Apollo 16 report all three chutes are fine. They are looking good.

SC (garble) Roger. We copy.

PAO The crew aboard the Ticonderoga can now see the spacecraft visually from the ship. Eleven minutes now since time of entry into the Earth's atmosphere.

PAO Apollo Control Houston. The recovery support here in Mission Control reports that the astronauts described their condition as outstanding. We're at 12 minutes now since entry into the Earth's atmosphere.

RECOVERY We are now having the helicopters at the window.

PAO This is Apollo Control Houston. An observer on the Ticonderoga estimates a distance from the ship about one mile.

RECOVERY (garble)

SC Roger.

RECOVERY (garble)

SC Roger.

RECOVERY Okay. (garble) has now been accomplished. Splashdown, splash! The Command Module is stable 2, stable POO. All three main chutes are in the water.

SC Roger.

RECOVERY (garble)

PAO This is Apollo Control Houston. We copy time of splashdown as at 290 hours 37 minutes 6 seconds ground elapsed time.

SC Roger.

RECOVERY Recovery, this is Ticonderoga, you are clear to deploy.

SC Yes, we copy, Roger, will we stay in upright

SC position, or what?
RECOVERY Roger.
PAO Apollo 16 in a stable 2 condition at the present time with the Apex end of the spacecraft under water.
RECOVERY Apollo 16, you're under control.
SC Roger.
SC Photo (garble)
RECOVERY Roger.
RECOVERY (garble) under water (garble) Command Module.
SC Roger.
RECOVERY Command Module is still stable 2. ELS helicopter is making it's approach to the bay chutes standing by to deploy (garble)
SC Roger.
RECOVERY (garble) the first main chute.
SC Roger.
RECOVERY ELS swimmers are 13 from (garble)
PAO The first swimmer now in the water to put the sea anchor onto the Command Module.
RECOVERY -- stable 2. We can see one upright bag inflated.
SC Roger.
RECOVERY (garble) ELS crew of swimmers are deployed at the second main chute.
SC Roger.
RECOVERY And the third team of ELS swimmers are being deployed.
SC Roger.
RECOVERY Swimming upright in back of the (garble) now.
SC Roger.
PAO The swimmers from the Earth Landing System helicopter are now on the water. They will endeavor to retrieve the parachutes as well as the Apex cover.
SC Roger.
PAO One of the parachutes reported submerged, the other two on the surface.
RECOVERY The uprighting bags are completely inflated at this time, and the Command Module is in a 90 degree position. The recovery shows their position standing by.
SC Roger.

END OF TAPE

SPEAKER Standing by.
SPEAKER Roger.
PAO And the command module is stable 1 stable 1.
SPEAKER Roger.
SHIP Apollo 16 this is Ticonderoga requesting
Astronaut condition, over.
RECOVERY Apollo 16, Apollo 16 this is recovery,
how do you hear me, over.
SHIP Recovery this is Ticonderoga deploy your
swimmers. Recovery.
AIR BOSS Recovery hilo is making approach to the
approach to the command module.
SHIP Roger.
SC Okay, recovery this is Apollo 16. We're
piling up the stabilizer now and we're confirmed to seeing you.
SPEAKER Roger, we copy.
SPEAKER Swimmer has been deployed from the recovery
hilo.
SC We saw some line - from a shoot around the
apex, recovery you might watch them. I guess you know that.
PAO One of the swimmers in the water now
preparing to attach the sea anchor. Report from the crew of
Apollo 16 says their doing fine.
SPEAKER Relatively close about 10 yards. Recovery
are positioning it away from the command module. Two of the
upriding bags are completely inflated. The third is partially
inflated.
PAO Sea anchor about 8 feet around is made of
a cloth designed to drag and slow down the spacecraft in water.
RECOVERY Of the interegrated astronaut condition,
over.
SC The condition of the astronauts is out-
standing. It's super.
SHIP Ticonderoga, roger.
RECOVERY Okay, the waves down here are about
12 to 15 knots. Sea swell running about 4 feet. The command
module is riding very nicely. The swimmer is attaching the
sea anchor to the command module.
PAO We heard John Young aboard Casper reporting
the condition of the crew as outstanding. The first swimmer
in the water now in the process of attaching the sea anchor.
This made of cloth designed to drag in the water and slow
down the spacecraft.
SPEAKER The second swimmer has been deployed.
SPEAKER Roger.
ROCOVERY And the third seven man raft has been
deployed from the the left hilo.
PAO Two seven man rafts now dropped into the
water. These will be moved up next to the spacecraft.

SPEAKER Roger.
PAO The sea anchor now attached and being inspected now by the first swimmer. The next two swimmers will take a floatation collar with them and there are two attachments in the front part of the spacecraft. And it unfolds like the caterpillar. While one swimmer steadies this floatation collar the other swimmer takes it around - wraps it around the spacecraft. The first swimmer in the water now cutting away the parachutes shroud lines freeing the spacecraft from the parachutes.

SPEAKER All three of the seven man Helo rafts have been inflated. Swimmers are proceeding to recover main chute.

SPEAKER Roger.

SPEAKER Okay, recovery we're going we're going to tied up here and on comm until it's time to put the collar around.

SHIP Ticonderoga copy.

SPEAKER The swimmer has attached the sea anchor, and is expected to pull the module and he's giving his signal for the recovery hilo to deploy the floatation collar.

SPEAKER Roger, and the recovery helo is making his approach on the module.

SPEAKER And two swimmers have the floatation collar package have been deployed from the recovery helo.

PAO The two swimmers and floatation collar have been dropped now into the water adjacent to the spacecraft.

SPEAKER The swimmers are positioning the floatation collar package.

SPEAKER Roger.

PAO There are now nine swimmers in the water. Three who will be working with the crew of Apollo 16 as they leave the spacecraft and the other six swimmers in an endeavour now to recovery the parachutes.

SPEAKER Roger, in progress now. Recovery over.

SPEAKER Roger, this is (garble). Hilo off the raft have been inflated. The swimmers are dropping some of thier gear and getting ready to retrieve the main chutes. All the rafts are in position over the main chutes. And their just progressing retrieving the chutes now.

SPEAKER Roger.

SPEAKER And the bungie cord has been attached completely around the command module and the floatation collar is around is now being moved around the module.

SPEAKER Roger.

SPEAKER Approximately one-third around the module.

SPEAKER Roger.

PAO We have a report that all three main parachutes are being pulled into the raft. And meanwhile at

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PAO the command module the bungie cord is around the command module now and the floatation collar will be encircling it.

SPEAKER The floatation collar is three-quarters of the way around the module now.

SPEAKER Roger.

PAO The floatation collar now halfway around the command module. It's made of a rubberized cloth like material.

PAO After the floatation collar is attached next to the sea anchor the collar will be inflated.

SPEAKER That's the apex collar in order.

SPEAKER Roger.

PAO After inflation of the floatation collar the three swimmers will climb up on the collar and attach restraining straps on top of the spacecraft where the upriding bags are located.

SPEAKER The antennas on top of the command module appear to be in good condition.

SPEAKER Roger.

SPEAKER (Garble) the last swimmer is preceeding to deploy the main (Garble).

SPEAKER Roger.

PAO The slight chop in the waves caused by the ten to twelve knot winds is making the job of installing the floatation collar go a little slower.

SPEAKER Apollo 16 ...

END OF TAPE

PAO The flotation collar now being inflated.
SPEAKER Flotation collar is inflated.
AIRBOSS And the (garble) is giving the take off
for the recovery in order to deploy the (garble) raft.
SPEAKER Roger. Now --
SPEAKER Crewman has boarded the floatation collar.
SPEAKER Okay.
AIRBOSS Recovery HELLO is making it's approach.
RECOVERY Thank you.
PAO The ship reported to be just about a mile
away from the floating command module.
SPEAKER Egress raft has been deployed.
SPEAKER Roger.
SPEAKER Okay, this is Ticonderoga, you are third
to assist (garble)
SPEAKER (garble) I am debarking at this time.
The egress raft has been inflated. (garble) swimmers around
the floatation collar. Their attaching the collar straps
to the command module.
PAO The 3 swimmers now attaching the restraining
straps on the top of the spacecraft.
SPEAKER (garble)
SPEAKER Roger.
PAO The raft just dropped will be moved to the
spacecraft hatch.
SPEAKER And the final attachment to the floatation
collar are now being made, the swimmers are attaching the egress
raft to the floatation collar.
SPEAKER Okay.
SPEAKER (garble) is running very steadily now.
The egress raft has been attached to the floatation collar.
PAO We'll stand by now for lowering of life
preservers from the helicopter which will passed along to
the crew of Apollo 16.
SPEAKER It's approach, the LPUS are being lowered
on the (garble)
SPEAKER Roger. (garble) LES.
SPEAKER (garble) Over.
SPEAKER (garble) no luck yet. Being retrieved
and the (garble) the raft at the time (garble)
SPEAKER Roger.
SPEAKER The (garble)
PAO As recovery is in progress we've been
handed splash coordinates from two sources, the onboard
computer readout shows coordinates of 43.2 minutes south
156 degress 11.4 minutes west, the ship estimated 44.8
minutes south, 156 degress 14 minutes west.
SPEAKER (garble) to Ticonderoga, interogative 1
1, over.

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SPEAKER Apex says no joy n the apex cover. And
don't (garble) the shoots (garble).

SPEAKER Roger. (garble)

SPEAKER Roger.

SPEAKER Okay, recovery we're going to open the
door. (garble)

END OF TAPE

PAO The Earth landing system helicopter reports that they were unable to recover the apex cover of (garble) drogue chutes. The three main chutes were recovered.

RECOVERY Recovery standing by the hatch. And Casper the command module is being opened. (garbled sentence) command module.

PAO The life preservers have been passed inside to the crew of Apollo 16. The swimmer is Lt. Earl Koshida who was the first to jump from the primary recovery helicopter.

SC Recovery, Apollo 16 is going off comm.

RECOVERY This is recovery, roger.

RECOVERY The hatch to the command module is being slowly opened by the crewmen.

SC Roger.

RECOVERY (garble) the hatch open, standing by to assist the astronaut in egressing the module.

PAO And this Apollo Recovery raft is especially contoured to fit along side of the floatation collar attached to the spacecraft.

TICONDEROGA (garble) Ticonderoga (garble)

RECOVERY Roger, (garble) standing on the floatation collar holding the hatch open standing by to assist the astronauts. We cannot see inside the module putting the LCU's on at this time.

TICONDEROGA Roger (garble).

RECOVERY Roger (garble). (garble) about 100 yards upwind of the command module, we cannot see inside the raft, the recovery appears to be progressing normally we should (garble). In one of the rafts we see one of the chutes (garble). (garble) standing on the floatation collar looking inside the command module.

PAO After the crew of Apollo 16 leaves the command module, a helicopter will hover overhead and lower a Billy Q net usually they're about 75 feet above the spacecraft when the crew members one-by-one are hoisted up to the helicopter and the Billy Q net which is about 4 feet square and made of stainless steel tubing.

RECOVERY One of the main chutes (garble) will be retrieved and the other two are 3/4 retrieved.

TICONDEROGA Roger.

TICONDEROGA (garbled words) apex cover, over.

RECOVERY Roger.

PAO The crew of Apollo 16 will be hoisted aboard the helicopter with the Billy Q net it's four feet square at the base, 6 feet in length and made of stainless steel tubing.

RECOVERY Roger.

TICONDEROGA The bags around the LPU have been handed out of the command module (garble) egress (garble)

RECOVERY The command module is riding very

RECOVERY nicely, the sea anchor is fully deployed
(garbled) position.
TICONDEROGA Roger.
RECOVERY And the first astronaut is egressing
the module. And the first astronaut to egress the module
is in egress raft -
TICONDEROGA Roger.
RECOVERY And the second astronaut is egressing,
and is in the egress raft.
RECOVERY Roger. And the third astronaut is
dgressing.
TICONDEROGA Roger.
RECOVERY And all of the astronauts are in the
egress raft at this time.
TICONDEROGA Roger.
RECOVERY The swimmers are preparing to close
the hatch to the command module.
TICONDEROGA Roger.
RECOVERY And the swimmer has closed the hatch
on the command module.
TICONDEROGA Roger,
RECOVERY All of the astronauts are (garble) of
the egress raft.
TICONDEROGA Roger.
RECOVERY The swimmer opened the hatch to the
module temporarily but it is now closed again.
TICONDEROGA Roger.
RECOVERY One of the astronauts is over and insuring
the hatch is completely closed.
TICONDEROGA Roger.
RECOVERY (garbled sentence).
TICONDEROGA Roger.
RECOVERY Astronaut Mattingly is (garbled) the
command module is closed.
TICONDEROGA Roger.
RECOVERY And the hatch has been closed to the
command module and the swimmer is in the egress raft with
all 3 astronauts.
TICONDEROGA Roger.
RECOVERY The swimmer is (garble) recovery (garbled
sentence) and we've already recovered that.
TICONDEROGA Roger.
RECOVERY Recovery helo is in position over the
egress raft recovery net is being lowered. The swimmer has
the recovery net. The first astronaut is in -

END OF TAPE

PAC This astronaut is inside the Recovery.
SPEAKER (garbled)
PAO (garbled)
PAO He's at the cargo door of the Recovery Helo.
And the first astronaut is inside the recovery helicopter.
PAO (garbled) the first astronaut aboard was
Astronaut Duke.
PAO Recovery Hero reports Astronaut Duke is
aboard and is making his approach for the second pickup.
SPEAKER Roger.
PAO Recovery Helo is over the (garbled)
SPEAKER Roger.
PAO And second astronaut is in the Recovery belt.
PAO The second astronaut is being lifted into
the Recovery Helo.
PAO The second astronaut is inside the Recovery
Helo.
SPEAKER The second astronaut onboard the Recovery
is Astronaut Mattingly.
CAPCOM Roger.
PAO (gargled) Recovery
CAPCOM Roger.
PAO And the third astronaut is being hoisted in-
to the Recovery Helo.
PAO All three astronauts are inside the Recovery
Helicopter. (gargled) Astronaut John Young.
PAO A (garbled) in the Recovery Helo has closed
the door to the helo. The Recovery Helo is breaking over the
(garbled).
PAO Zero, zero, one, spot five. That should put
it practically directly in front of our TV camera here, about
midship.
PAO Touchdown.
PAO John Young, Charles Duke, Ken Mattingly home
from the Moon. Safely back aboard the U. S. S. Ticonderoga.
Now the red carpets go out. The honor guard comes out. And
you can see them now rolling that bright red carpet right up to
the door of the helicopter. Now the steps being moved in. And
there we are from the falls in our photo helicopter. That was
Charles Hilly, The Nasa Team Leader, who was first aboard to
greet the Astronauts.

END OF TAPE

PAO -- NASA team leader who was first aboard to greet the astronauts (music) also with military escorts. Salute, a wave. John Young, Charles Duke, Ken Mattingly, Apollo 16 crew. (music) Larry King, the NASA Public Information Officer, also with them at this point. Now they'll be greeted by Captain Edward Boyd. Rear Admiral Henry Morgan, (music) Captain Edward Boyd.

BOYD It gives me a great deal of pleasure this morning on this special day, to welcome the crew of Apollo 16 to the deck of Ticonderoga. The officers and men of Ticonderoga this historic ship, are very proud indeed to be a part of this historic mission. Commander Lex Davis, Ticonderogas' senior Chaplain will offer our prayer to almighty God.

CHAPLAIN Let us pray. Almighty God, who alone prescribes the order of the universe, we lift our thanks to the for the safe return of the astronauts Young, Duke, and Mattingly. As the Heavens once lead wise men to the cradle of Thy Son, so may the knowledge of Thy celestial creation guide us to greater understanding of Thy will for mankind. That Thy goodness may be magnified throughout the world to the honor of Thy holy name. Amen.

BOYD Admiral Henry S. Morgan, commander of the Pacific Recovery Force, will introduce the crew of Apollo 16.

MORGAN This is a moment of pride and humble triumph for the crew of Apollo 16. Those of us of the Pacific Recovery Force, spread about this ocean, are honored to be a small segment of the picture. I know the crew is glad to be back and we're all glad to see you back. Now Captain John Young, the commander of Apollo 16.

YOUNG It really is great to be back. I think I have to say thank you to 4 different groups of people today. I'm not going to make a long speech because that isn't my nature. But I've been working with a couple of guys for about 2 years, they've always demonstrated their clever intelligent resourceful and all the good words. But in the last 10 days on a mission where kind of critical things had to go just right where we had some rather difficult problems and rather minor problems, Ken and Tom---Ken and Charlie, performed an outstanding manner. Their professional cool courage and discipline in situation which required time critical button punching, stick throwing, switch pulling, was tremendous and they also exhibited a cool, professional courage in situations where they were involved in some personal risk, I feel. So to them I would like to say outstanding, for your performance. For the benefit of you Navy guys that's a hardy well done. The second group of people is the people at the Manned Spacecraft Center, in Houston, Texas and around the country, who did so much during our mission to make it go. We could tell by every message that came to us, that there had been a lot of people working all over the country

YOUNG to do their jobs. And by golly we appreciate it because we made that mission go, thanks to you. The third group of people, that no body ever talked about much, is the American taxpayer, I think you taxpayers, we taxpayers, you got your money's worth on this one. You really did. You saw an example of go oriented team work and action. The kind of thing that made this country great and the kind of thing that's going to keep it that way. You also saw and sitting right there in Casper right now a mission of discovery. There are secrets in that vehicle that nobody knows what is in there. There is some basic knowledge and understanding in that vehicle right now. We're going to find those things out and one of these days, it's going to benefit us all. I can guarantee you, I feel that if we hadn't done our mission we'd have been remiss in not uncovering this basic knowledge. And what I'm saying is that that basic knowledge is locked in those secrets. It's pushing back the last real frontier, the frontier of the unknown. And by golly that's essential to the survival of humanity on this planet. And the fourth group of people and maybe the people I feel more at home with than anybody is the good old U.S. Navy, thanks for being here, cause I'll tell you right about now, Charlie, Ken, and myself aren't swimming too good.

MATTINGLY Well I don't want to make any speech. I never thought a group of all males could look so good. But you sure do. We'll fix that in a short time too. But thank you very much for doing a very professional job and to all the people back in Houston, and the rest of the NASA team, I hope they get a chance to come back and personally say thank you to all of you folks. You really did a bang up job. Thank you.

DUKE It's pretty difficult for me to put my feelings into words right now. We've seen so much and done so much in the last 11 days, it's almost indescribable the beauties and the scenes you see. You don't think that, that one can be topped and then sure enough the next one tops it. Most clearest in my mind is the entry right now and that's hard to top. It's going to be a while to digest everything that has happened, but I along with John, would like to say thank you from the bottom of my heart to the 4 groups of people that he mentioned. Thank you again, everyone, it's good to be back and to be looking forward to seeing every one again. Thank you.

(music and clapping)

SPEAKER Welcome back.

PAO They'll go below for their first physical examinations, a rest period and indeed a shower. The Apollo 16 crew home safely, back aboard the prime recovery vessel the U.S.S. Ticonderoga, and there they go. So my thanks --

PAO This is Apollo Control, Houston, and this concludes our coverage of Apollo 16.

PAO So from the Apollo 16 recovery vessel, all is well out here this morning--

END FO TAPE